CARPENTER'S
YOUNG
SCHOLAR'S
MANUAL OF
ARITHMETIC

42.

289.

THE
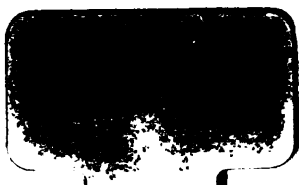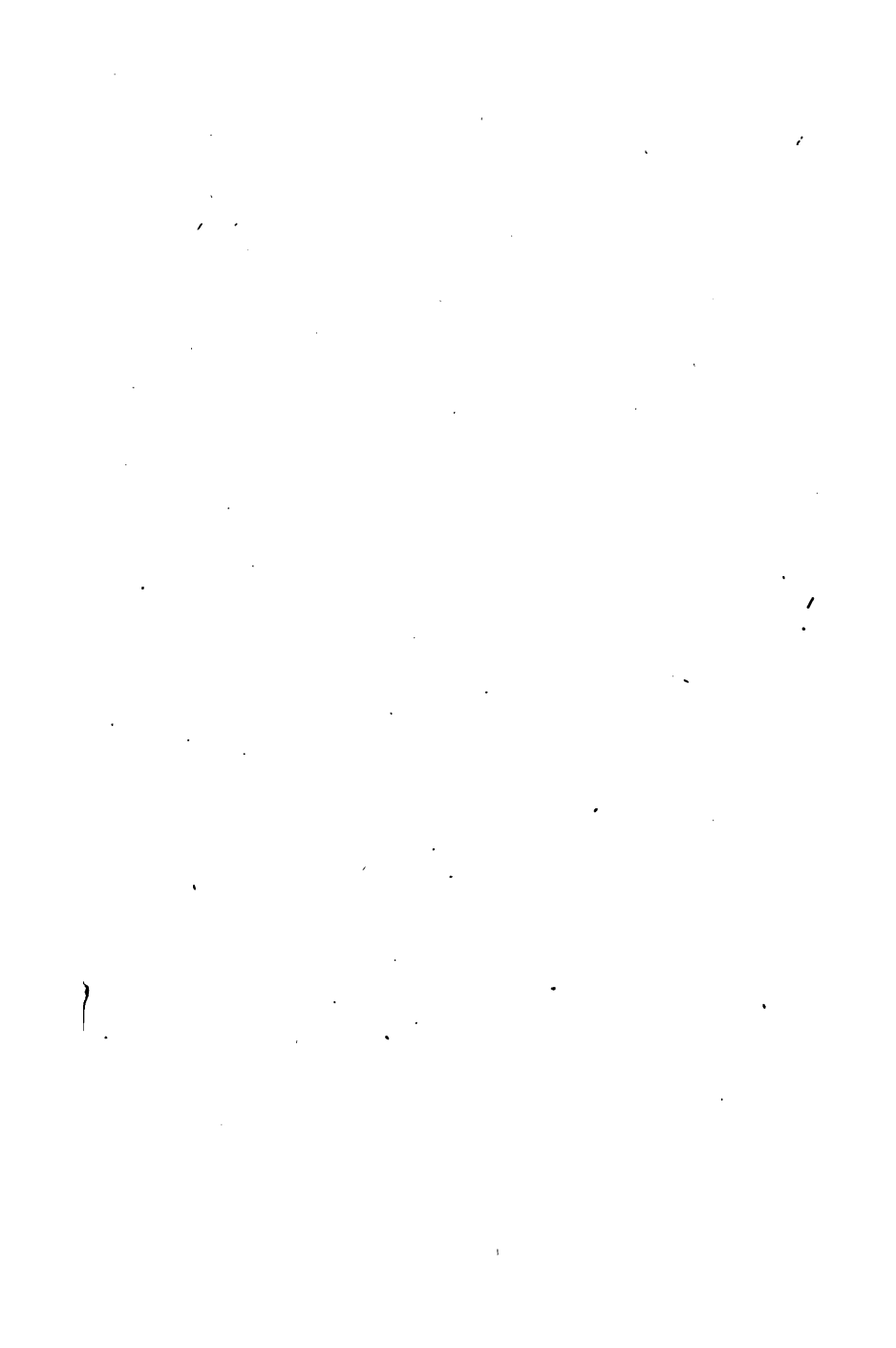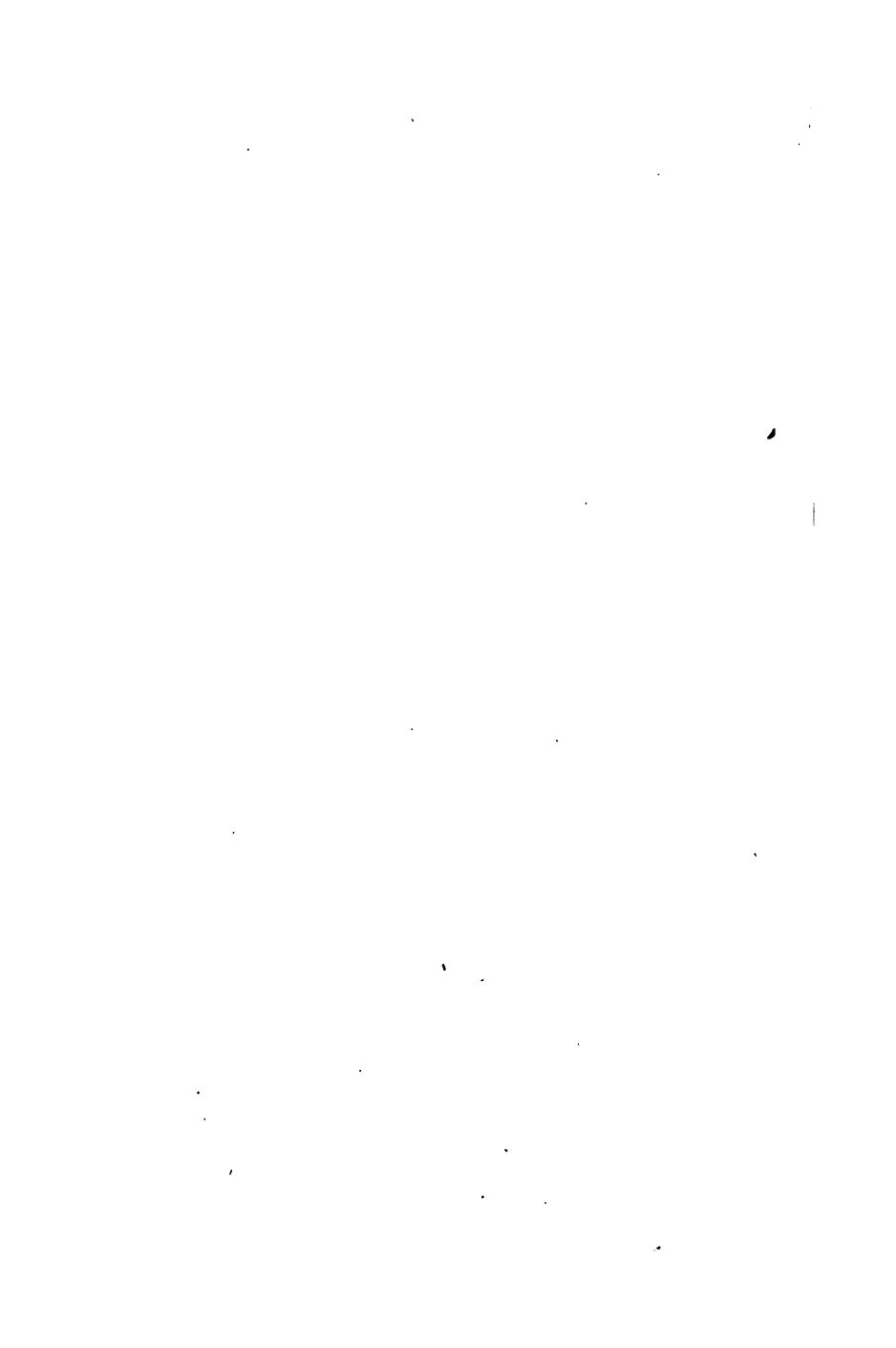
YOUNG SCHOLAR'S MANUAL

OF

ELEMENTARY ARITHMETIC:

CONTAINING

A VARIETY OF USEFUL AND PRACTICAL

EXAMPLES,

/

SYSTEMATICALLY AND PROGRESSIVELY ARRANGED.

TO WHICH ARE ADDED

SOME EASY AND SIMPLE MENTAL CALCULATIONS, MISCELLANEOUS
QUESTIONS, BILLS OF PARCELS, APPROPRIATE TABLES OF
MONEY, WEIGHTS AND MEASURES, ETC.

DESIGNED FOR THE USE OF SCHOOLS.

BY THOMAS CARPENTER.

Author of " The Scholar's Spelling Assistant," &c. &c.

2 8 9 .

PREFACE.

THE following pages it is hoped will not be deemed
unworthy of the attention of those whose avoca-
tion it is, amongst other professional engagements,
to guide the young scholar through the elementary
branches of arithmetical knowledge. In the present
volume will be found a greater variety in the art of
computation than is given in the generality of books
on the same subject; and everything that appeared
superfluous or irrelevant has been omitted. In
almost all publications which the Author has seen,
there are long and complicated rules, which the
pupil cannot readily commit to memory, nor dis-
tinctly understand; and to copy all these into what
is usually denominated a cyphering book is surely an
unnecessary waste of time; and it not unfrequently
happens that they are transcribed very slovenly and
incorrectly. A few words judiciously spoken, on the
part of the teacher,* will be of greater avail than a

* A writer on this subject says, "Arithmetic, indeed, is in its appli-
cation the most serviceable of our acquirements ; and, if properly
taught, produces still higher advantages in the exercise it affords to
the reasoning faculties. It is, however, a common error i~ ~~h~~'~
to teach this science as if it were a species of sleight of han?
piece of conjuration. Everything in it is ordinarily don(
of *rules;* the memory, and not the judgment, is appea

thousand written ones, and operate more powerfully in effecting the object in view, and promoting a more sure and rapid improvement.

There are doubtless, many books published on the science of Arithmetic, and not a few deserving of encouragement; but still the art is not so far worn out as to supersede the attempt of rendering it more practical and advantageous. Walkingame's treatise has had a considerable share of patronage, although perhaps it may be regarded as somewhat too theoretical. Like many others, however, it has its merits, and contains much useful and valuable information.

The Author has selected some questions with their answers from other publications, and incorporated them with his own; in doing so, he trusts he need not apologize to his brethren in the profession; but for which he feels himself under peculiar obligations. From the reception the Author's former works have met with, he is encouraged to hope that his present attempt will not be without benefit, to the rising generation.

many who, by repeated exercise, have acquired a tolerable facility in the performance of arithmetical operations, have not the slightest knowledge of the principles upon which they are founded."

THE

YOUNG SCHOLAR'S MANUAL,

&c. &c.

~~~~~~~~~~~

ARITHMETIC is the art of computing by numbers, which are represented by signs called digits or figures; as 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.*

The four fundamental Rules of Arithmetic are Addition, Subtraction, Multiplication, and Division.

An Integer is any whole quantity or number, as 1, 6, 28, 214, 426, &c.

Compound numbers are such as consist of integers and fractional parts, as £10 15s 6½d, or £24⅘.

ARITHMETICAL CHARACTERS.

+ *Plus, or more,* the sign of Addition.
— *Minus, or less,*   .   Subtraction.
× *Multiplied by,*   .   Multiplication.
÷ *Divided by,*   .   Division.
= *Equal to,*   . .   Equality.

: *Is to*
: : *so is* } As 1 : 2 : : 3 : 6, Signs of Proportion.
: *to*

$\sqrt[2]{}$ Is the sign of the Square Root.

$\sqrt[3]{}$ Is the sign of the Cube Root.

ROMAN NUMERALS.

I.	1	X.	10	C.	100
IV.	4	XL.	40	D.	500
V.	5	L.	50	M.	1000
		MDCCCXL.			

* This cipher 0 (*pr.* nought) is of no value taken by itself, but being annexed to the right of a figure increases ten-fold; thus, 4⁰ expressed in figures, signifies forty.

B

NUMERATION*

Numeration instructs us how to read and write numbers.

THE TABLE.†

Trillions	Hundreds of Thousands of Billions	Tens of Thousands of Billions	Thousands of Billions	Hundreds of Billions	Tens of Billions	Billions	Hundreds of Thousands of Millions	Tens of Thousands of Millions	Thousands of Millions	Hundreds of Millions	Tens of Millions	Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units
3	4	1	9	8	7	6	5	4	8	9	8	7	6	5	4	3	2	1

Write in WORDS the following numbers.

7	591	1000	671417
17	617	5010	80041
24	827	4111	710000
36	3849	71218	1840

Write in FIGURES as follows :—

One	Two hundred and four	Nine thousand one hundred and two
Three	Five hundred and fifteen	One thousand eight hundred and forty
Eight	Two thousand five hundred and eleven	Three millions
Twelve	Twenty thousand	Forty billions
Nineteen		
Twenty-eight		
Fifty		
One hundred		

* Numeration is of great importance in Arithmetic, as without it we should not be able to understand the value of figures after we had made them.

† The young pupil should thoroughly understand this table, at least as far as *millions*; beyond which, perhaps, it may not be necessary to proceed, except in some few particular instances.

SIMPLE ADDITION.

Simple Addition teaches to find the full or total amount of sums or quantities of the same name.

£	s.	yards.	bushels.	gallons.
1	14	241	6249	141268
—	—	216	116	271164
2	26	171	164	71681
3	40	276	16	4116
4	16	112	14	100
5	12	70	8	18
6	6	—	—	—
21 *Ans.*	114	—	—	—
20	100			
21 *Proof.*	114			

pints.	pecks.	tons.
6124161	81371841	914214695
1711610	17691718	76971814
8716968	2716989	10768218
7169	417694	769169
168	107824	77482
4	1000	365

Bought a top for 6d. a kite for 4d. a bag of marbles for 3d. a ball for 9d. a knife for 10d. and several other playthings for 11d; how many pence have I laid out? *Ans.* 43.

Paid for flour 17s. for bread 21s. for cheese 17s. for butter 12s. for paper, pens, and ink 5s. for garden seeds 2s. and for flower pots 1s.; how many shillings have I spent? *Ans.* 75.

My mother went to a linen draper's shop and purchased the following goods, viz. 29 yards of cloth, 37 yards of calico, 17 yards of flannel, 27 yards of muslin, 109 yards of tape, 37 yards of sheeting, and 81 yards of blue frin how many yards did she buy in all? *Ans.*

The building of St. Paul's cost £860000, the Royal Exchange (since burnt down) £80000, the Monument £218000, Blackfriars Bridge £152840, Westminster Bridge £218000, and the Mansion House £40000; what was the expense of the whole? *Ans.* £1568840.

A grazier has in his fold 247 sheep, grazing 4008, on the road to London 516, at Smithfield 1101, and at the butcher's for slaughter 310; how many has he in all?
Ans. 6182.

A gentleman left £3200 to his widow, £5000 to his eldest son, £1225 to his second son, and £795 to his only daughter; what was the whole amount? *Ans.* £10220.

~~~~~~~~~

SIMPLE SUBTRACTION.

Simple Subtraction shows the difference between sums or quantities of unequal numbers.

	bushels.	gallons.
24656364	82769183*	62710841
12325132	79280748	37007182
12331232 *Ans.*	3488435	
24656364 *Proof.*	82769183	

ounces.	quarts.	feet.
71691421	50171261	11712640
37110794	9712817	971006

Take 1027695428 from 9871642751 and its remainder five times.

Subtract 412968143 from 9187625290 and its remainder six times.

---

* The reason why you borrow 10, and place it to the upper figure is, because numbers increase in a ten-fold proportion to the left hand; as ten ones make ten, ten tens a hundred, ten hundreds a thousand, &c. You must always add 1 to the next figure, when you *do borrow* 10, and not else.

If my brother lend me 1426 marbles, and I return him 949, how many more should he have ?   *Ans.* 477.

Suppose I lend a friend £200, and he pays me in part £73, what is the balance between us ?   *Ans.* £127.

Deduct £17329 from twenty thousand pounds..*Ans.*£2671.

If a peach tree had 74 peaches on it, and the wind blew off three dozen and two; how many were left ?   *Ans.* 36.

A person in trade bought 7006 yards of calico, and sold to his customers 2198 yards; what quantity has he in hand ?   *Ans.* 4808 yards.

There are in the old Testament 23214 verses, and in the New 7959; how many more are there in the former than in the latter ?   *Ans.* 15,255.

SIMPLE MULTIPLICATION.

Simple Multiplication is nothing more than a short method of performing Addition.*

In this rule there are three things to be observed :—

First, the number to be multiplied, which is called the *multiplicand*.

Secondly, the number by which you multiply, which is called the *multiplier*.

Thirdly, the number produced, which is called the *product*.

1234567890 *Multiplicand.*	416738945	148309357
2 *Multiplier.*	3	4
2469135780 *Product.*		

743216953	954326580	122334455
5	4	3

---

* For, instead of adding up, it is only to multiply, and the sum is dor

831065849	197621054	763508914
8	9	10

374200681	107654289	987654321
11	12	1200*

6
3✕5† 143261895   176929580   876543215
6   23   436   5678

429785685
286523790

3295023585

942760218   726009574   77606153800
921600   670058   700689000

176895432‡   327604981   116294897
13   14   16

2299640616

* If there are noughts, or cyphers, at the right hand of the multi-
plicand or multiplier, or both, bring them down, and annex them to
the product.. See the *Sixth* following sum.

† This is the proof by casting out the *nines*, which the teacher will
easily explain. But the surer method of proving the sum is to divide
the product by the multiplier, and if the quotient come like the mul-
tiplicand, the operation is correct.

‡ The work, as this example shows, may be wrought in *one* line
with any number under 20, by taking in the right hand figure every
time you multiply.

. Multiply 473653980 by 24

    6

  2841923880

     4

  11367695520

Multiply 987605324 by 42

     7

      6

Multiply 123456789 by 96.

Multiply 921067854 by 144.

If the multiplicand is 719326187, and the multiplier 748, what is the product?   *Ans.* 538055987876.

A gentleman has coming in £40 a week, how much is that in one year, or 52 weeks?   *Ans.* £2080.

How many marbles must I have, to give 36 boys 11 each?   *Ans.* 396.

How many hours has a boy or girl lived who is ten years old?   *Ans.* 87660.

What is the amount of a thousand thousand?
              Ans. 1000000.

What time is gained by a person who rises at 5 o'clock in the morning, instead of 8, during a life of 80 years, reckoning 365 days to the year?   *Ans.* 87600 hours.

A person laid by £2 a week; what did he save in 15 years?   *Ans.* £1560.

SIMPLE DIVISION.

Simple Division shows how often one number is contained in another.

The *divisor* is the number you divide by; the *dividend* is the number to be divided; the *quotient* is the number produced by division; and what is over is called the *remaindr*

8   *Simple Division.*

Divisor.   Dividend.
    2) 469837153   3) 769311046   4) 111614207

Quotient 234918576—1 rem.
               2

   Proof 469837153*

  5) 756945628   6) 764284361   7) 111110004

  8) 887766554   9) 100100111   10) 717122210

    11) 746278432916   12) 111226400521

Divide 476270533 by 24.   Divide 211642691 by 45.

$24 \begin{cases} 6) \overline{476270533} \\ 4) \overline{79378422—1} \end{cases}$
$\overline{19844605—2} \Big\} 13†$

$45 \begin{cases} 9) \overline{211642691} \\ 5) \end{cases}$

Divide 112461893 by 54.   Divide 654321045 by 121.
Divide 712468912 by 72   Divide 742684325 by 144.
Divide 365068140 by 1¼.   Divide 234975432 by 4½.

    1¼ 365068140   4½ 234675432
    4   4   2   2

New Divisor 5 1460272540 New Div^d. 9) 469350864

      292054512   52150096

Divide 123740045 by 2¾.

* Unless the proof agree with the top line, or *dividend,* the sum is wrong.

† This is found by multiplying the first divisor 6 by the last remainder 2, and adding in the first remainder 1, which makes the whole remainder 13.

Divisʳ Dividend.   Quotient.

13) 14164841 (	1089603	23,00) 26483415,00* (1151452
13	13	23 .
——	——	——
116	3268809	· 34
104	1089603	23
——		——
. 124	2 remainder.	118
117	——————	115
——	14164841 proof.	——
. . 78	——————	. . 33
78		23
——		——
. . 41	´	104
39		92
——		——
. 2 remainder.		121
——		115
		——
		. . 65
		46
		——
		19
		——

37) 147637650 (	75) 942654311 (
123) 111464923 (	2193) 714169216 (
1763) 512769814 (	9210) 700412483 (
73000) 117142690 (	8765)672111161029 (

If the dividend be 404724042928858, and the quotient 85420861741, what is the divisor?   *Ans.* 4738

What is the quotient of 209316854128 divided by 436?   *Ans.* 480081527—356 *rem.*

The earth is said to travel at the rate of 68000 miles an hour; what distance is that per minute?   *Ans.* 1133 *miles*—20 *rem.*

* Here the *noughts* are equally cut off, and do not interfere with the working of the sum.

What number is that which multiplied by 217 will make the product 4528573? *Ans.* 20869.

COMPOUND ADDITION.

Compound Addition brings sums of different names or denominations into one whole or total amount.

A farthing is made thus, ¼—a halfpenny thus, ½—and three-farthings thus, ¾.

f.	d.	s.	d.	£.	s.	d.
¼	6	1	6¼	4	14	6½
½	4½	2	4			
¾	3	7	10	1	10	2
½	1¼	6	6	1	16	2½
¼	6	0	7	6	11	10½
½	11	0	2½	4	16	11
¾	10¾	0	1¾	6	14	9¼
				9	6	4¾
3¼ *Ans.* 3 6½		19	1½	35	10	10½ *Ans**
				30	16	4
				35	10	10½ *Prf.*

£	s.	d.	£	s.	d.	£	s.	d.
27	16	10	1614	19	2½	71168	3	3¼†
17	19	6	2110	10	0	1711	6	4
4	17	11½	171	6	10½	1416	1	10
3	3	0	11	11	9	900	7	10
1	1	11¼	11	17	4¾	148	11	6
0	19	6½	1	1	3	719	8	11
0	0	3¾	0	2	6	10	4	3

* Here it may be plainly seen and understood that 1 is carried for every four in farthings, 1 for every 12 in pence, and 1 for every 20 in shillings; because 4 farthings make a penny, 12 pence one shilling, and twenty shillings one pound.

† It seems quite unnecessary to multiply sums like these, as the

A boy spent in cakes 7½d. in marbles 2s.3d. in dumps and tops 3½d. and for several other things 3s.11½d.; how much did he spend in all ?   *Ans.* 7s.1½d.

A corn factor owes a farmer for wheat £912 . 14 . 2—for barley £254.0.4½—for rye £104.19.1½—for beans £342.14 ₄ 7½—and for peas £576 ; 19 .10½ ; what is the whole debt ?   *Ans.* £2191 . 8 . 1¾.

My father's last week's expenses amounted to the following sums : meat £1 ¶ 7.6—bread £1.0.10¾—flour 17s.10d. vegetables 4s. 8¾d—tea and sugar £1.0.6—butter and cheese 4s. 7d.—letters and parcels 2s.10d. and a quarter's wages of £3.10 to the house maid; what was the whole expenditure ?   *Ans.* £8.18.10½.

A grocer has in his warehouse sugar worth £500—teas of different sorts and qualities valued at £88.16.1—currants worth £35—spices £37.19.1½—rice 40 guineas and a half —and various other articles to the amount of £209.17.3¾; what is the value of the whole stock in trade ?
                                         Ans. £914 . 3 . 0¼.

COMPOUND SUBTRACTION.

Compound Subtraction teaches to find the difference of two sums of different denominations.

	£	s.	d.		£	s.	d.		£	s.	d.
From	42	10	6½	Lent	19	17	6¼*	Borrowed	100	0	0
Take	11	5	2¼	Rec^d.	16	18	9½	Paid	83	15	6
Difference	31	5	4¼	Diff. .	2	18	8¾	Balance	16	4	6
Proof	42	10	6½	Proof	19	17	6½	Proof	100	0	0

teacher generally sets the first line in a book, and then completes the sum by adding more figures on a slate, which when done, the young scholar enters into his cyphering book.

* When the lower figure cannot be taken from the upper, if in farthings borrow 4, in pence 12, and in shillings 20, taking care to carry 1 every time you have occasion to borrow. The pounds are worked like Simple Subtraction.

£	s.	d.
627	11	6
179	17	10

£	s.	d.
417	11	6
79	17	8½

£	s.	d.
501	11	2½
71	13	1

£	s.	d.
7171	10	1
469	0	0¾

£	s.	d.
1110	11	0¼
71	9	8¼

£	s.	d.
9140	11	3¼
9	19	11¾

	£	s.	d.
Lent	9000	0	0

	£	s.	d.
Received at different times ⎰	4000	15	6
	1710	16	6
	812	7	0
	100	0	0
	77	14	10
	10	10	0
	5	5	0

Received in all

Remaindr due

Proof

	£.	s.	d.
Borrowed	500	15	6

	£	s.	d.
Paid at sundry times ⎰	200	0	0
	23	15	6
	79	10	0
	36	19	6
	2	10	0
	1	0	0

Paid in all

Rem. unpaid

Proof

Take £1167527.11.2¼ from £9972407.10.4¾. and its remainder four times.

Subtract £1062781.16.0½. from £9870061 and its re-mainder six times.

I lent one of my schoolfellows a sovereign, and he has paid me in part 13s. 10½d; how much does he owe me?
                                    Ans. 6s. 1½d.

If I send a five pound Bank of England note to discharge a bill of £3.17.8½; what change shall I have out of it?
                                    Ans. £1.2.3½.

My uncle made me a present of half a sovereign, and I bought a book for 3s. 6d. and a penknife for half-a-crown; how much money had I left?   *Ans.* 4s.

If the debtor side of an account be £4271.13.6, and the creditor side £987 19.7¾, what is the balance?
<div align="right">*Ans.* £3283.13.10¼,</div>

What is left out of £10 after paying for linen £2.10.8½. shoes and boots £2.5.6, and other things £1.19.10½.?
<div align="right">*Ans.* £3.3.11.</div>

COMPOUND MULTIPLICATION.

Compound Multiplication teaches the method of multiplying sums or quantities of more than one denomination.

To find the price of a ¼, ½, or ¾, take parts of the given price, and add them up with the other figures.

	s.	d.			s.	d.		£.	s.	d.
	0	7¼			1	9¼	¼	4	16	8
		2				3				4¼
Ans.	1	2½	*Ans.*		5	4¾		19	6	8
								1	4	2
							Ans.	20	10	10

		£	s.	d.			£	s.	d.		£.	s.	d.
½	½	5	12	6½	½	½	8	12	4¼		38	17	6¼
				5½	¼	½			6¾				7
		26	2	8½			51	14	3				
		2	16	3¼			4	6	2¼				
							2	3	1		719	11	0¾
		30	18	11¾									8
							58	3	6¼				

£.	s.	d.		£.	s.	d.		£.	s.	d.
719	11	0¾		1171	19	6½		97141	17	10¼
		8				9				10

| ¼ | 4713 | 17 | 0½ | ⅜ ½ | 5716 | 10 | 6¾ | Or for ⅝ multi- |
| | | | 11⅛ | ¼ ¼ | | | 12⅝ | ply the top |

line by 5, and
divide by 8,
which add to
the rest.

Value 13 feather beds at £4.14.4 each. *Ans.*£61.6.4.

If one load of meadow hay cost £4.17.6, what will 15 loads come to ?   *Ans.* £73.2.6.

Find the cost of 18 tons of coals at 37s. 6d. per ton.
           Ans. £33.15.

If a workman earn 3s. 6d. per day, what will be due to him in 20 days ?   *Ans.* £3.10.

What will two dozen ciphering books come to at 3s.9d. each ?   *Ans.* £4.10.

Suppose a bullock cost £18.17, what would 30 cost at the same price ?   *Ans.* £565.10.0.

What will 42 cherry trees come to at 5s. 4½d. each ?
           Ans. £11.5.9.

If a china jug cost 11s. 5d. what would 64 be worth ?
           Ans. £36.10.8.

Find the price of 65 china bowls at 28s. 3d. per bowl.
           Ans. £91.16.3.

At 2s. 8d. for a gallon of ale, what must be given for 74 gallons ?   *Ans.* £9.17.4.

At 5s. 4d. for a stone of veal, how much for 95 stone ?
           Ans. £25. 6. 8.

Value 101 barrels of beer at £3.13.8 per barrel.
           Ans. £372.0.4.

What will 128 hogsheads of cider come to at £7.17.2. per hhd ?   *Ans.* £1005.17.4.

What is the value of 134 gold watches at 20½ guineas each?   *Ans.* £2884.7.

Suppose an ounce of silver cost 5s. 4¾d. what cost 142¼ ounces? £38.7.6½

If a yard of cloth cost 2s. 11d. what did 149½ yards come to? *Ans.* £22.2.3¼

What are 154¾ loads of manure worth at 5s. 10d. a load? *Ans.* £45.2.8½

Value 168* sheep at 58s. 9d. per head. *Ans.* £493.10.

Find the cost of 173¼ pieces of serge at £1.11.7½. per piece. *Ans.* £274.6.11¼

What is the price of 189¾ reams of paper at 23s. 8½d. per ream? *Ans.* £224.18.7¾

What must be given for 200 bay mares at 45 guineas each? *Ans.* £9450.

If a freehold tenement be sold for £217.11.6. what would 232 be worth? *Ans.* £50477.8.

Value a thousand store pigs at 55s. 8d. each? *Ans* 2783.6.8.

What will 5428½ lb. of honey come to at 3s. 1d. per lb.? *Ans.* £836.17.10½.

Find the value of 10426 freehold cottages at £89.15.6. each. *Ans.* £935994.3.

———

Value 1½ barrel of beer at 16d. a gallon. *Ans.* £3.12.

1 barrel = 36 gal.		16 = 1	4
½ ditto = 18			9
54 gallons, at 16d. per gal.		12	0
			6
Ans. £3	12	0	

* If the number is above 156, the work is generally best performed by *Practice*, but may be done by Multiplication, first multiplying by 100, and then by 10 or 1, as the case may require, and, lastly, adding up the whole together for the answer, or full amount.

What are 2 tons of potatoes worth at 3s. 6d. per cwt ?
Ans. £7.

Pay a man for 17 weeks' work (reckoning six days to the week) at 2s. 9d. a day. *Ans.* £14.0.6.

What are 20 quarts of beer worth at 2d. per pint?
Ans. 6s. 8d.

What will a barrel and a half of beer cost at 3d. per pint? *Ans.* £5.8.

What are 1000 quarts of ale worth at 2s. 6d. a gallon ?
Ans. £31.5.

Bought 40 bushels of peas at 1s. 3d. a peck; what did they come to ? *Ans.* £10.

Multiply £100 by $4\frac{1}{2}$, $5\frac{1}{4}$, and $6\frac{5}{8}$.
Ans. £412.10—£525—£662.10.

What must be paid for $4\frac{1}{2}$ dozens of port wine, at 3s. 6d. a bottle? *Ans.* £8.18.6.

Value $2\frac{3}{4}$ tons of potatoes at $1\frac{1}{2}$d. per lb. *Ans.* £38.10.

What will a year's wages come to at 3s. 10d. a week ?
Ans. £9.19.4.

Eighteen stone and a half of meat at $7\frac{1}{2}$d. per lb.; $2\frac{1}{2}$ hhds. of ale at $4\frac{1}{2}$d. per quart; 1 cwt. of soap at $7\frac{1}{2}$d. per lb.; 1 firkin of butter at $11\frac{3}{4}$d. per lb.; and 2 qrs. $11\frac{1}{2}$ lb. of starch at $10\frac{1}{4}$d. per lb. *Ans.* £4.12.6.—£10.2.6.—
£3.10.—£2.14.10.—and £26.15.6.

If I put by $1\frac{3}{4}$d. per day, how much shall I have at the year's end ? *Ans.* £2.5.7½.

If madeira be sold at 11s. $11\frac{1}{2}$d. a gallon, what is it a tun ? *Ans.* £150.13.6.

COMPOUND DIVISION.

Compound Division teaches to divide any given sum or quantity by a whole number.

	£.	s.	d.ʼ		s.	d.		s.	d.		£.	s.	d.
2)	4	7	6½*	3)	11	9	4)	10	6	5)	11	14	6½

Ans.   2 3 9¼

        2
_____

Proof. 4 7 6½

	£.	s.	d.		£.	s.	d.		£.	s.	d.
6)	121	0	6	7)	7716	9	10½	8)	11161	0	11

If 10 yards of muslin cost £2 . 17 . 10, what cost 1 yard?
                              Ans. 5s. 9¼d $\frac{6}{10}$

At £17 . 16 . 6, for 11 pair of boots, what cost 1 pair ?
                              Ans. £1 . 12 . 4¾ $\frac{7}{11}$

What is the price of a pound of veal, if 12 lb. cost 8s. 6d. ?
                              Ans. 8½d.

Divide £300 into 14 equal shares.   *Ans.* £21 . 8 . 6¾

Suppose 16 lb. of butter cost 14s. 8d., what did 1 lb. cost ?
                              Ans. 11d.

What is the 18th part of one hundred guineas ?
                              Ans. £5 . 16 . 8

* What is over in pounds (if any) bring into shillings ; what is over in shillings, bring into pence ; and what is over in pence, bring into farthings.

Divide the sum of £500 into 22 equal parts.

Ans. 22.14.6$\frac{2}{3}$

If 24 pieces of cloth cost £110, what cost 1 piece?

Ans. £4.11.8.

What is the price of a tub of butter, if 60 tubs cost £121?   *Ans.* 2.0.4.

Sold 66 hearth rugs for £199.15.6, what was the price of 1?   *Ans.* £3.0.6$\frac{1}{4}$

If a workman receive £97.10 for 72 weeks' employment, how much was that weekly?   *Ans.* £1.7.1.

If I give £10 for 90 pair of hose, what is that a pair?

Ans. 2s. 2$\frac{1}{2}$d.

Required the price of a gallon of vinegar, when 96 gallons cost £16?   *Ans.* 3s. 4d.

What must I give for a hundred weight of coals, if 99 cwt. cost 11 guineas?   *Ans.* 2s. 4d.

If 108 bottles of brandy cost £21.12, what is the price of a single bottle?   *Ans.* 4s.

Divide ten thousand pounds into 121 equal moities.

Ans. £82.12.10$\frac{1}{2}$

Find the answer of £4261.11.9$\frac{3}{4}$, divided by 111. *

Ans. £38.7.10$\frac{1}{4}$

Let £24.10.6$\frac{1}{2}$ be divided by $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$,

Ans. £6.2.7$\frac{1}{4}$—£12.5.3$\frac{1}{2}$—£18.7.10 ,

Divide £510.16.6, by 4$\frac{5}{8}$.   *Ans.* 110.8.11$\frac{1}{2}$ $\frac{2}{3}\frac{6}{7}$

What is cheese per lb. at 56s. per hundred weight?

Ans. 6d.

If 4 stone of pork cost £1.2.8,   what is 1 lb. worth?

Ans. 8$\frac{1}{2}$

---

* This and several other examples which follow, will exemplify the nature or practice of Long Division of Money; but if it be judged desirable, the instructor will find no difficulty in introducing a greater variety of a more common and simple application than those already exhibited.

What are spelling books a dozen, when 104½ dozen cost £51.16.9? *Ans.* 9s. 11d.

Bought 85¾ yards of superfine grey cloth for £75.16.8, what did it cost me per yard? *Ans.* 17s. 8d. $\frac{84}{343}$

Tell the price of butter per lb., when 198¼ lb. cost £11.11.4. *Ans.* 1s. 2d. $\frac{2}{793}$

Required the price of a gallon of wine, at £60.15, for 2 hhds. 35 gals. *Ans.* 7s. 6½d. $\frac{38}{161}$

If 364 gals. 3 qt. of Irish whiskey can be bought for £109.15, what is a quart worth? *Ans.* 1s. 6d. $\frac{78}{1459}$

If I have a yearly income of £100, what may I spend a day? *Ans.* 5s. 5¾ $\frac{5}{365}$

Suppose 19 hundred quills cost £6.7.10, at what rate is that a hundred? *Ans.* 6s. 8½ $\frac{18}{19}$

What is the twenty-third part of a 50£ bank of England note? *Ans.* £2.3.5½ $\frac{22}{23}$

If a clerk in a merchant's counting-house, is paid 80 guineas a year for his services, what is his weekly salary? *Ans.* 1.12.3½ $\frac{40}{52}$

Divide £1720.10.6, by 19 ⅜ *Ans.* £88.16 $\frac{4}{155}$

Divide two thousand pound by 42 $\frac{1}{10}$ *Ans.* £47.10.1½ $\frac{395}{421}$

Let £10,000 and 1000 guineas be divided by 13 ⅔ *Ans.* £739 $\frac{6}{41}$

How much ought a person to lay by every day, who wishes to make up the sum of £150 in a year? *Ans.* 8s. 2½ $\frac{120}{365}$

Divide a prize of £5876.10, equally amongst 168 sailors, after deducting ⅛th for the captain and officers. *Ans.* £27.19.8.

ADDITION OF WEIGHTS AND MEASURES.

TROY WEIGHT.*

lbs.	oz.	dwt.	gr.		lbs.	oz.	dwt.	gr.
126	10	15	20		134	9	2	0
117	8	16	16		271	11	16	10
169	6	8	10		162	6	10	6
16	4	8	10		761	0	11	6
19	2	6	14		100	3	12	19
8	11	15	8		41	2	14	12

A jeweller bought as follow:—11 lbs. 1 oz. 10 gr. of gold; 13 lb. 10 oz. 15 dwt. of gold rings; 4 lb. 15 dwt. of silver watch cases; 5 lb. 1 oz. 21 gr. of Spanish dollars; 1 lb. 2 oz. 17 dwt. 13 gr. of different pieces of silver; and 37½ lb. of foreign coin; what is the weight of the whole?

Ans. 72 lb. 10 oz. 8 dwt. 20 gr.

AVOIRDUPOIS WEIGHT.

tons.	cwt.	qr.	lb.		cwts.	qr.	lb.	oz.
162	14	3	16		116	0	15	14
116	10	2	10		141	1	16	6
142	3	0	17		200	2	21	8
76	6	1	8		111	3	6	7
81	6	3	10		34	0	10	11
9	2	1	21		1	2	19	0

A grocer sold 1 cwt. 2 qr. 14 lb. of lump sugar; 1 qr. 11½ lb. of green tea; 2 qr. 17 lb. 1 oz. of black tea; 3 qr. 15 lb. of spices; 17 lb. 13 oz. of moist sugar; and 2 qr. 10½ oz. of rice; what quantity of goods did he dispose of?

Ans. 4 cwt. 1 qr. 1 lb. 14 oz.

* Let the table be repeated before the operation is begun, and so in like manner with the rest, whether in Addition, Subtraction, Multiplication, or Division.

APOTHECARIES' WEIGHT.

lbs.	oz.	dr.	sc.		oz.	dr.	sc.	gr.
164	10	5	2		169	5	2	18
111	11	4	1		110	6	1	19
712	6	7	1		417	1	1	10
117	8	0	0		116	2	0	6
41	2	2	1		300	4	2	4
4	0	4	0		27	0	2	15

An apothecary mixed the following ingredients together :—Epsom salts, weighing 2 lb. 3 oz.; rhubarb 1½ lb.; senna 1 lb. 2 oz. 1 scr. 15 gr.; magnesia 10 oz. 2 scr. 15 gr.; jalap 2 lb. 15 gr.; and gum ammoniac 1 oz. 1 scr. 18 gr.; what is the weight of the whole?

Ans. 7 lb. 10 oz. 2 dr. 1 scr. 3 gr.

WOOL WEIGHT.

lasts.	sa.	wey.	tod.		weys.	ld.	st.	clo.
141	8	1	4		171	4	1	1
171	7	0	3		111	0	0	1
216	10	1	0		47	6	0	1
471	9	1	2		36	4	1	0
31	6	0	5		18	5	0	1
4	4	1	2		3	1	1	1

CLOTH MEASURE.

yards.	qr.	na.	in		ells eng.	qr.	na.	in.
110	3	2	1		126	3	2	0
217	1	1	0		101	2	1	0
116	1	1	0		116	2	1	0
14	2	0	0		315	0	3	0
8	0	3	0		114	0	3	1
2	3	2	1¼		21	1	0	0¼

I bought 92 yards 2 qr. of Irish linen; 15 yds. 3 qr. 1 na. of coarse sheeting; 21 yds. 1 qr. of flannel; 11 yds. 2 qr. 1 na. 1¼ in. of print; 11¼ yds. of fine calico; and 15½ yds. of muslin; tell me what quantity I have to pay for?

Ans. 167 yds. 3 qr. 2 na. 1¼ in.

ALE AND BEER MEASURE.*

butts.	hhd.	bar.	kil.		hhds.	gal.	qt.	pt.
117	1	1	1		164	50	3	1
71	1	0	1		112	18	3	1
10	1	0	1		141	7	2	0
9	0	1	0		10	16	0	0
8	0	1	0		11	14	0	1
3	1	1	1		12	28	1	1

A publican received at one-time 2 butts, 1 hhd. 2 bar. 8 gallons of porter; at another 1 hhd. 18 gal. 3 qt.; at another 4 barrels; at another 3½ hogsheads; at another 1 butt, 18 gallons, and at another 2½ barrels; how many butts, hhds, &c. did he have in all?

Ans. 8 butts, 1 hhd. 1 bar. 17 gal. 3 qts.

WINE MEASURE.

pipes.	hhd.	gal.	qt.		hhds.	gal.	qt.	pt.
141	1	21	3		116	11	2	1
61	1	16	2		100	16	1	1
18	1	10	1		41	29	1	1
5	0	6	1		4	34	0	1
4	0	9	3		6	2	0	0
1	1	3	0		9	6	2	0

A wine merchant has the following wines and spirits in his cellar:—2 pipes of port; 1 hhd. 10 gal. 1 qt. of sherry;

---

* Whether it be Ale or Beer, there are 36 gallons to the barrel and 9 to the firkin.

1 hhd. 15 gal. 1 pt. of cider; 1 pipe, 1 hhd. 3 qt. of madeira; 19 gal. 3qt. 1 pt. of brandy; 50 gal. of rum; and 10½ gal. of gin; what is the whole quantity?

Ans. 5 pipes, 0 hhd. 43 gal. 2 qt. 0 pt.

LONG MEASURE.

miles.	fur.	po.	yd.		poles.	yd.	ft.	in.
161	0	30	2		126	0	1	3
111	2	31	0		131	0	1	3
417	6	18	0		411	0	2	3
500	3	3	2		716	0	3	0
671	4	9	0		10	0	1	6
378	1	18	1½		12	0	1	0

From London to Deptford is 4 mi. 2 fur.; from Deptford to Crayford 10 mi.; from Crayford to Dartford 2 mi.; from Dartford to Chalk-street 9 mi.; from Chalk-street to Rochester 6 mi. 2 fur. 20 po.; from Rochester to Sittingbourne 10 mi. 2 fur. 10 po.; from Sittingbourne to Bocton-street 10 mi.; from Bocton-street to Canterbury 6 mi.; and from Canterbury to Dover 15 miles; how far is it from London to Dover? *Ans.* 72 mi. 6 fur. 30 po.

DRY MEASURE.

qrs.	bu.	pk.	gal.		bus.	pk.	gal.	qt.
120	1	2	1		141	2	1	3
141	2	3	1		111	3	1	2
111	6	0	1		171	1	1	1
714	3	0	0		211	1	0	1
41	0	3	0		6	1	0	1
16	4	1	1		2	0	1	0

Sent to market 15 qrs. 3 bus. 1 pk. of flour; 19 bus. 3 pk. of oatmeal; 11 qrs. 1 gal. of pollard; 2 qrs. 1 bus. 3 pk. 1 gal. of hemp seed; 3 qrs. of bran; and 7½ bus. of peas; I demand the whole quantity?

Ans. 35 qrs. 0 bus. 2 pk. 0 gal.

CUBIC OR SOLID MEASURE.

yards.	feet.	in.		yards.	feet.	in.
511	19	1001		216	14	141
141	16	711		141	20	511
171	20	116		312	16	716
314	14	41		116	14	200
110	1	10		14	13	14
69	0	3		10	11	13

SQUARE MEASURE.

acres.	r.	po.		rods.	po.	yd.	ft.
217	3	30		117	31	0	0
111	2	14		141	14	0	1
471	2	10		71	20	0	0
36	1	8		41	0	4	1
14	1	5		6	0	0	0
10	3	0		9	18	0	0

A surveyor having measured six pieces of land, found one to contain 8 ac. 2 r. 15 po.; a second 11 ac. 10 po.; a third 15½ acres; a fourth 22 ac. 1 r. 19 po.; a fifth 12 ac. 2 r. 18 po.; and a sixth 17 ac. 2 r. 11½ po.; how many acres, &c. were surveyed?   *Ans.* 87 ac. 2 r. 33½ po.

TIME.

years.	mo.	wk.	da.
191	8	3	6
161	10	2	1
211	11	1	4
371	6	0	0
48	0	0	3
3	2	3	2

days.	ho.	min.	sec.
121	15	50	54
100	6	21	16
61	7	13	21
14	10	41	6
12	16	6	6
1	4	0	12

SUBTRACTION OF WEIGHTS AND MEASURES.

TROY WEIGHT.

lbs.	oz.	dwt.	gr.
300	8	16	21
71	9	18	23

lbs.	oz.	dwt.	gr.
521	6	15	14
271	1	17	18

From 700 lb. 18 gr. of gold, take 527 lb. 3 oz. 11 dwt. 19 gr.

AVOIRDUPOIS WEIGHT.

tons.	cwt.	qr.	lb.
371	18	3	15
171	17	3	19

cwts.	qr.	lb.	oz.
370	2	19	14
17	0	22	0

Bought 4 tons 3 cwt. 1 qr. 14 lb. of cheese, and sold 3 tons 2 cwt. 19 lb.; what have I in hand?

o

APOTHECARIES' WEIGHT.

lbs.	oz.	dr.	sc.		oz.	dr.	sc.	gr
841	10	7	1		417	2	2	18
79	0	7	2		179	0	2	19

From 18 lb. 7 oz. of medicine, take 15 lb. 2 oz. 6 dr. 2 sc. 1 gr.

WOOL WEIGHT.

lasts.	sk.	wy.	td.		st.	wy.	td.	st.
117	6	1	4		110	1	5	1
61	0	1	5		17	1	4	0

CLOTH MEASURE.

yards.	qr.	na.	in.		ellseng.	qr.	na.	in.
528	2	3	0		511	4	2	0
117	3	2	1		91	2	3	1

If I take 998 yds. 3 qr. 1 na. of cloth from 1796 yds., what will be left ?

ALE AND BEER MEASURE.

bars.	fir.	gal.	qt.		hhds.	gal.	qt.	pt.
361	3	7	3		121	50	3	0
171	3	8	2		71	51	0	1

Subtract 9 bar. 8 gal. 2 ot. of Ale from 18 bar. 3 qt. 1 pt.

WINE MEASURE.

hhds.	gal.	qt.	pt.		pipes.	hhd.	gal.	qt.
811	60	3	1		111	0	48	2
179	62	0	0		74	1	49	3

From a cask of brandy containing 34 gals. 2 qt., take 19 gals. 3 qt. 1 pt.

LONG MEASURE.

leagues.	mi.	fur.	po.		mi.	fur.	po.	yd.
311	2	7	31		171	5	30	0
114	2	7	38		99	6	38	4

From 600 leagues 1 mi. 10 po., take 511 leagues 2 mi. 7 fur. 1 po.

DRY MEASURE.

qrs.	bus.	pk.	gal.		loads.	qr.	bus.	pk.
121	7	0	1		164	4	6	0
94	7	3	0		102	4	7	3

Take the difference between 17 loads 3 qr. 5 bus. of wheat, and 18 loads 7 bus. 3 pk.

TIME.

years.	mo.	wk.	da.		mo.	wk.	da.	ho.
417	4	3	2		411	3	5	20
179	5	3	6		91	0	6	20

If 476 yrs. 3 mo. 7 ho. be taken from 500 yrs., what number of years, &c., will remain ?

MULTIPLICATION OF WEIGHTS AND MEASURES.

TROY WEIGHT.

lbs.	oz.	dwt.	gr.
371	8	18	21
			2

lbs.	oz.	dwt.	gr.
17	11	0	11
			3

AVOIRDUPOIS WEIGHT.

tons.	cwt.	qr.	lb.
141	18	3	21
			4

cwts.	qr.	lb.	oz.
59	3	17	12
			5

APOTHECARIES' WEIGHT.

lbs.	oz.	dr.	sc.
271	10	7	2
			6

oz.	dr.	sc.	gr.
110	4	1	15
			7

CLOTH MEASURE.

yards.	qr.	na.	in.
114	2	3	0
			8

ells eng.	qr.	na.	in.
138	4	3	0
			9

ALE AND BEER MEASURE.

hhds.	gal.	qt.	pt.
141	50	3	1
		10	

bars.	gal.	qt.	pt.
214	31	2	1
			11

WINE MEASURE.

pipes.	hhd.	gal.	qt.		hhds.	gal.	qt.	pt.
318	1	61	3		348	19	3	1
			11					12

LONG MEASURE.

leagues.	mi.	fur.	po.		mi.	fur.	po.	yd
228	2	7	30		148	6	32	2½
			6					7

DRY MEASURE.

qrs.	bus.	pk.	gal.		bus.	pk.	gal	qt.
168	7	3	1		392	3	1	2
			8					9

TIME.

years.	da.	ho.	mi.		days.	ho.	mi.	sec.
412	319	15	41 × 24		197	16	52	48 × 64
		6 × 4 = 24						8 × 8 = 64
			4					8

DIVISION OF WEIGHTS AND MEASURES.

TROY WEIGHT.

	lbs.	oz.	dwt.	gr.			lbs.	oz.	dwt.	gr.
2)	418	10	16	21		3)	500	0	10	21

Ans.   2

Ans.   3

Prf.

Prf.

AVOIRDUPOIS WEIGHT.

	cwt.	qr.	lb.	oz.
4)	716	2	17	12

	qrs.	lb.	oz.	dr.
5)	411	16	14	13

APOTHECARIES' WEIGHT.

	lbs.	oz.	dwt.	gr.
6)	600	8	7	2

	lbs.	oz.	dwt.	gr.
7)	119	4	2	11

CLOTH MEASURE.

	yds.	qrs.	na.	in.
8)	728	3	2	0

	Fr.ells.	qr.	na.	in.
9)	316	2	1	0

ALE AND BEER MEASURE.

	kild.	gal.	qt.	pt.
10)	767	14	2	1

	butts.	hhd.	gal.	pt.
11)	333	1	31	3

WINE MEASURE.

	pipes.	gal.	qt.	pt.
12)	345	100	3	1

	hhds.	gal.	qt.	pt.
12)	354	47	0	1

LONG MEASURE.

	miles.	fur.	po.	yd.
8)	611	3	3	2

	fur.	po.	yd.	ft.
9)	115	10	3	2

	years.	da.	ho.	mi.

Divide 728 10 15 29 by 56

	days.	ho.	mi.	sec.

Divide 619 19 52 50 by 144*

$8 \times 7 = 56$ for the divisors. $12 \times 12 = 144$ for the divisors.

* Let these be divided by *Long Division* also.

A merchant in London bought of a farmer in Kent, 7 bags of hops:—No. 1 weighed 3 cwt. 2 qr. 14 lb.; No. 2, 3 cwt. 1 qr. 12 lb.; No. 4, 2 cwt. 3 qr. 15 lb.; No. 5, 4 cwt. 1 qr. 11½ lb.; No. 6, 5 cwt. 15 lb.; No. 7, 3 qr. 17½ lb.; and No. 8, 3 cwt. 1 qr. 11 lb.; the merchant, by agreement, was to pay the carriage to town; how many hundred weight had he to pay for?
Ans. 23 cwt. 2 qr. 12 lb.

A farmer grew upon his land, 217 qr. 3 bus. of wheat; 219 qr. 5 bus. 3 pk. of barley; 277 qr. 3 bus. of one sort of oats, and 249 qr. of another sort, besides 219 qr. 3 pk. of beans; 57 qr. 4 bus. of peas; and 57 qr. of vetches; how many quarters of corn, &c., did he grow in all?
Ans. 1297 qrs. 0 bus. 2 pk.

What is the total weight of 36 lb. 7 oz. 3 dr. 1 sc. 6 gr.; 14 lb. 6 oz. 3 dr. 1 sc. 17 gr.; 16 lb. 7 oz. 4 dr. 2 sc. 7 gr.; 13 lb. 6 oz. 3 dr. 9 gr.; 41 lb. 5 oz. 6 dr. 1 sc. 18 gr.; and twice 10 lb. 18 gr.? *Ans.* 142 lbs. 9 oz. 6 dr. 0 sc. 13 gr.

A young man married when he was 23 yrs. 3 wk. 6 da. of age, and at the time of his marriage, his father was 57 yrs. 9 mo. 2 wk. 1 da. old; how old was the father when his son was born? *Ans.* 34 yrs. 8 mo. 2 wk. 2 da.

A draper has sold 12 yds. 2 qr. 2 na. from a piece of Irish linen, which at first measured 28½ yds.; what quantity has he left? *Ans.* 15 yds. 3 qr. 2 na.

A grocer had in his warehouse 16 cwt. 1 qr. 9 lb., of sugar; 17 cwt. 3 qr. 14 lb., of soap; 12 cwt. of tea; and 14 cwt. 3 qr. 14 lb. of raisins. He dealt out to one customer 4 cwt. 2 qr. 14 lb., to another 6 cwt. 3 qr. 14 lb., and lastly he sold 3 cwt. 1 qr. 15 lb.; what weight of goods had he by him? *Ans.* 46 cwt. 0 qr. 22 lb.

Suppose a silver punch bowl weigh 2 lb. 9 oz. 11 dwt.; what will 26 such bowls weigh? *Ans.* 72 lb. 8 oz. 6 dwt.

If a ship sail 12 mi. 3 fur. 4 vds. in a day; what distance would she reach in a year?
Ans. 4517 mi. 5 fur. 25 po. 2½ yd.

Divide 1526 yds. 2 qr. 1 na. of cloth into 24 equal lengths.
Ans. 63 yds. 2 qr. 1 na.

If the divisor be 47, and the dividend 9469 pipes 2 hhd. 2 gal. 2 pt. of Maderia; what would be the quotient?

Ans. 201 pipes 0 hhd. 61 gal. 5 pt. $\frac{21}{47}$.

What is the weight of 4 doz. teaspoons, if each spoon weigh 17 dwt. 17 gr.?   *Ans.* 3 lb. 6 oz. 10 dwt.

A wine merchant compounded 2 tuns 3 hhd. 41 gal. of raisin wine with 2 hhd. 29 gal. of French brandy; when he has sold 1 tun. 2 hhd. 61 gal. of it, how much will remain?   *Ans.* 1 tun 3 hhd. 9 gal.

Add 196 hhds. 46 gal. 2 qt., to 124 hhd. 19 gal. 3 qt.; then deduct 6 hhd. 18 gal. 1 qt. from the whole quantity, and divide the difference into 365 equal parts.

Ans. 54 $\frac{110}{365}$ or $\frac{22}{73}$ gal.

REDUCTION.*

Reduction points out the way of bringing numbers from one name to another, without altering their value.†

How many half-pence are there in 20 guineas?

> Guineas
> 20
> 21
> ———
> 20
> 40
> ———
> 420
> 12
> ———
> 5040
> 2
> ———

Ans. 10080 half-pence = to 20 Guineas.

---

* It is necessary to understand this rule, both in Money and in ⁻ʰts and Measures, as a leading introduction to the Rule of Three.
† *great* names are brought into *small*, by MULTIPLYING with

How many guineas are equal in value to 10080 half-pence?

```
2 ) 10080
   ─────
12 ) 5040
    ────
   ⎧ 7 ) 420
21 ⎨    ───
   ⎩ 3 ) 60
        ──
```

Ans. 20 Guineas = to 10080 half-pence.

Bring £42.15.6¼ to farthings.   *Ans.* 41,065.

What number of halfpence are in £426.10?
                     Ans 204,720.

In £526.17.6 how many shillings and sixpences?
           Ans. 10,537 sh. 21,075 sixp.

In £200.14.3 how many threepences?   *Ans.* 16,057.

Change £179.11.6 into twopences.   *Ans.* 21,549.

What number of crowns, shillings, groats, and pence, are in £526?   *Ans.* 2104 cr. 10,520 sh. 31,560 gr. 126,240d.

How many guineas are equivalent to two thousand pounds?   *Ans.* 1904—16s. over.

How many half-guineas are there in £500?
                     Ans. 952—4s. over.

In £569.18.4 how many groats and halfpence?
          Ans. 34,195 gr. 273,560 half.

What number of crowns and shillings are there in £328.10?   *Ans.* 1314 cr. 6570 sh.

In 1200 groats, how many crowns, half-crowns, and sixpences?   *Ans.* 80 cr. 160 half-cr. 800 sixp.

so many of the less, as make one of the greater; and all *small* names are brought into *great*, by DIVIDING with so many of the less, as make one of the greater. The first two examples being solved, will explain this observation the more easily.

Change 142 pieces of silver, each valued at 45s. 6d., into threepences and pence. *Ans.* 25,844 thr. 77,532d.

Find how many groats are in 816 moidores, each 27s.
Ans. 66096.

Bring 26420 pieces of coin, each 6s. 3d. into groats.
Ans. 495375.

In 100,000 dollars, each 4s. 9d., how many half-pence ?
Ans. 11,400,000.

Reduce 14280 pence, to half-crowns, crowns, and pounds.
Ans. 476 half-cr. 238 cr. £59.—10s. over.

Bring 174,200 groats, to crowns and pounds.
Ans. 11,613 cr. 20d. over, £2903.—5s. over.

What number of sovereigns are in 24600 threepences, and the same number of sixpences ?
Ans. 922—10s. over.

In 426,500 French crowns, each valued at 4s. 3d., how many guineas ? *Ans.* 86,315—10s. over.

How many half-guineas are there in a million of groats ?
Ans. 31,746—1 gr. over.

Bring 82,542 sixpences to guineas, and then to pounds.
Ans. 1965 gui. 6s. over, £2063—11s. over.

In 10864 farthings, how many crowns, half-crowns, sixpences and pence, and of each an equal number ?
Ans. 28 of each.

In 342 crowns, how many guineas ?
Ans. 200—10s. over.

TROY WEIGHT.

In 120 lb. of silver, how many grains ? *Ans.* 691,200.

In 6 silver tankards, each weighing 16 oz. 4 dwt. 12 gr. how many grains? *Ans.* 46,728.

Bring 82000 grains to pounds, and back to grains.
Ans. 14 lb. 2 oz. 16 dwt. 16 gr.

If a pair of silver candlesticks weigh 3 lbs. 5 oz. 15 dwt., how many penny-weights in all ? *Ans.* 835.

How many table-spoons, each weighing 3 oz. 5 dwt., can be made out of 19 oz. 3 dwt. 14 gr., of silver ?
$$Ans.\ 5\ \tfrac{14\,26}{13\,80} = \tfrac{7\,03}{6\,90}.$$

Required the weight of gold to make 7 watch cases, each weighing 1 oz. 18 gr., and 9 others of 1 oz. 10 dwt., each. *Ans.* 1 lb. 8 oz. 15 dwt. 6 gr.

In 9120 grains of silver, how many tea-spoons, each half an ounce ? *Ans.* 38.

What is the weight of 6¾ dozen of spoons, each weighing 1 ounce and a half? *Ans.* 10 lb. 1 oz. 10 dwt.

AVOIRDUPOIS WEIGHT.

In 4,180,405 ounces of butter, how many hundred weight ? *Ans.* 2332 cwt. 3 qr. 7 lb. 5 oz.

If 10 Gloucester cheeses weigh 3 qt. 11½ lb., what number of ounces are there ? *Ans.* 1528.

How many ounces and drams are in 5248 lb. of snuff? *Ans.* 83968 oz. 1,343,488 dr.

In 10 chests of tea, each weighing 1 cwt. 3 qr. 16 lb., how many lbs ? *Ans.* 2120.

How many samples of butter, each weighing 2½ lb., can be made out of 3 firkins, each 56 lb ? *Ans.* 67—½ lb. over.

In 30 tons 18 cwt. 2 qr. 10 lb. 12 oz. 15 dr. how many drams ? *Ans.* 17,736,399.

In 510 parcels of sugar, each 18¼ lb., how many hundred weight? *Ans.* 83 cwt. 11 lb. 8 oz.

How many boxes of raisins, each 24 lb. 8 oz., can be filled out of 3 tons 17 cwt ? *Ans.* 352.

The middle arch of Southwark iron bridge weighed 1523 tons, how many half ounces is that ?
Ans. 109,168,640.

How many gallons of train oil, each gallon weighing 7½ lb., are there in 14 cwt. 2 qr. ?   *Ans.* 216—4 lb. over.

What is the weight of 18 sacks of potatoes, weighing 186 lb. each?   *Ans.* 29 cwt. 3 qr. 16 lb.

APOTHECARIES' WEIGHT.

In 21 lb. 5 oz. 4 dr. 2 scr. 18 gr., how many grains?
                                           Ans. 123,658.

Suppose an Apothecary wishes to make 2 lb. 1 oz. of medicine into doses of 1 sc. 18 gr. each, how many would there be?   *Ans.* 315 $\frac{10}{38}$

Reduce 180,045 scruples to pounds.
                          Ans. 625 lb. 1 oz. 7 dr.

Required the difference in grains between 7 parcels, each weighing 4 lb. 7 oz. 3 dr., and 2 dozen of 11 oz. 6 dr. 2 sc. each.   *Ans.* 49740.

In 300 lb. 8 oz. of rhubarb, how many doses of 2 dr. each?   *Ans.* 14432.

How many packages of 10 oz. are there in 56 lb. of bark ?
                                   Ans. 67⅕.

CLOTH MEASURE.

In 325½ yards of cloth, how many nails ?   *Ans.* 5208.

Bring 252 English ells to yards.   *Ans.* 315.

In 64 pieces of Irish linen, each 24½ yards, how many nails?   *Ans.* 25,088.

In 25 pieces of cloth, each 21 English ells, how many yards?   *Ans.* 656¼.

In 27 bales, each of 14 pieces, and each piece 21½ yards, how many Flemish ells ?   *Ans.* 10836.

How many suits of clothes can be made from a piece of cloth measuring 25½ yards, reckoning a coat at 1¾ yd. trowsers at 1 yard 3 na. and waistcoat at half a yard ?
                                   Ans. 7.

In a piece of linen, measuring 21 English ells, how many shirts can be cut of 3¾ yds. each?   *Ans.* 7.

LONG MEASURE.

How many yards are there in 596 miles? ·
Ans. 1,048,960.

In 427, 692 feet, how many miles?   *Ans.* 81 mi. 4 yd.

In 422 leagues, how many barley-corns?
Ans. 240,641,280.

How many barley-corns would reach round the world, which is equal to 360 degrees, each degree 69½ miles?
Ans. 4,755,801,600.

In walking 16 miles, how many times does a stick touch the ground, supposing it to do so at every third step to be 2 ft. 6 in.?   *Ans.* 10,590.

How many farthings would extend from the earth to the sun, which is reckoned 95 millions of miles distant, supposing 7 farthings equal to 6 inches?
Ans. 7,022,400,000,000.

How many times will a wheel of 8 feet in circumference turn in a mile?   *Ans.* 660.

From Dublin to Liverpool is 38 leagues; how many boats, each 21 feet in length, would be required to form a line between the two places?   *Ans.* 28,662 ⁹

LAND MEASURE.

In 648 acres, how many perches?   *Ans.* 103,680.
In 17,000 poles, how many yards?   *Ans.* 514,250.
In 19,680 poles or perches, how many acres?
Ans. 123.

How many gardens of 16 po. 4 yd. each, can be made from a field of 8 acres?   *Ans.* 79.

In 674 ac. 6 po., how many yards?   *Ans.* 3,262 ° ⁴ ⁵ ⁵

ALE AND BEER MEASURE.

How many pints of porter will 264 hogsheads produce?
Ans. 114,048.

Bring 2001 barrels of ale to half-pints?
Ans. 1,152,576.

In 15,620 kilderkins, how many quarts?
Ans. 1,124,640.

In 476 butts of beer, how many hogsheads and barrels?
Ans. 952 hhds. 1428 bar.

In 10 casks of beer, each containing 19½ gallons, how many quarts and pints?   *Ans.* 780 qts. 1560 pt.

What number of kilderkins are there in 843 butts?
Ans. 5058.

How many firkins, of 9 gallons each, can be filled out of 1 butt 1 hhd. and 1 barrel of beer?   *Ans.* 22.

At 2 quarts of ale at dinner, and three pints at supper daily, how many days will a butt last a family?   *Ans.* 123.

WINE MEASURE.

In 136 pipes of port wine, how many pints?
Ans. 137,088.

Bring 1300 tuns of Madeira into gallons. *Ans.* 327,600.

How many 1¾ pint bottles, can be filled from a hhd. of brandy?   *Ans.* 288.

In 12,096 pints, how many puncheons?   *Ans.* 18.

In 4 tuns 3 hhd. 51 gal., how many pints?   *Ans.* 9984.

A pipe of port wine is to be drawn off into an equal number of quart, pint, and half-pint bottles; required the number of each.   *Ans.* 288.

In 74,250 gallons of Cape wine, how many pipes, hogsheads, and tierces, and of each a like number?
Ans. 321 of each, and 109 gal. over.

A gentleman ordered his butler to bottle off a pipe of wine, that contained 126 gallons, into quarts and pints,

and to have an equal number of each; I demand how many dozen he had?   *Ans.* 28 doz. of each.

DRY MEASURE.

In 42,620 quarters of wheat, how many pints?
    Ans. 21,821,440.

Bring 26,408 gallons of oatmeal to quarters?
    Ans. 412 qrs. 5 bus.

How many quarters of corn are in half a million of quarts?   *Ans.* 1953 qr. 1 bus.

In 42 qr. 2 bus. of wheat, 3 qr. 2 bus. of rye, and 5 qr. 7 bus. 2 pk. of oats, how many pecks?   *Ans.* 1646.

How many horses would 7 lasts of oats feed, allowing half a peck to each?   *Ans.* 4480.

In 194 tons of coals, how many lbs?   *Ans.* 434,560.

How long will 10 tons of coals suffice for 3 fires, of which each burns 20 lb. daily?   *Ans.* 373½ days.

TIME.

In 1,504,260 minutes how many days and weeks?
    Ans. 1044 days 15 ho.—149 wk. 1 da.

How many minutes are there in 142 weeks?
    Ans. 1,431,360.

From January 1st, to December 31st (each day inclusive), how many days?   *Ans.* 365.

Bring 25 mo. 2 wk. 3 da. 19 ho., into hours and minutes.
    Ans. 17,227 ho. 1,033,620 mi.

How many times does a clock strike in 4 years?
    Ans. 227,916.

From the birth of our Saviour to the end of the year 1837, how many seconds?   *Ans.* 57,971,311,200.

When a boy is 12 years old, how many hours has he lived in the world?   *Ans.* 105,192.

How many seconds are there in a solar year, which consists of 365 days 5 ho. 48 mi. 57 sec.?   *Ans.* 31,556,937

THE RULE OF THREE DIRECT.

The Rule of Three Direct teaches, from three numbers or terms given, to find a fourth, which shall bear such proportion to the third, as the second does to the first.*

If 3 yards of flannel cost 2s. 7½d., what will 28 yards cost?   *Ans* £1.4.6.

```
yds.  s.  d.      yd.        yd.  yd.       s.  d.
If 3 :  2   7½  : :  28    Or If 3 :  28  : :   2   7½†
        12                              126         12
        ──                              ───         ──
        31                              168         31
         4                              336          4
        ───                                         ──
        126                          3 ) 3528       126
         28                          ─────────      ───
        ───                          4 ) 1176
       1008                          ─────────
        252                         12 ) 294
       ────                         ─────────
    3 ) 3528                  ◢      2,0 ) 2,4──6
    ─────────                      ──────────────
    4 ) 1176                       Ans. £ 1 . 4 . 6
    ─────────                      ──────────────
   12 ) 294
   ──────────
    2,0 ) 2,4──6
   ──────────────
   Ans. £1.4.6
   ──────────────
```

* Let the first and third terms agree in name, and bring the middle term (if a mixed or compound number) to the lowest name or denomination mentioned; then multiply the second and third terms together, and divide their product by the first term, and the quotient will be the answer in the same name as the second term is, or may be reduced to, which may be multiplied or divided, as the case may be, according to the rules of Reduction.

† Some authors recommend another method of stating the question in reference to the following rule :—Put in the *third* place that term which is of the same kind as the answer. If according to the nature and reason of the question, the answer is to be greater than the third

If 6½ yards of cloth cost 17s. 3¼d., what cost 40 yards ?
Ans. £5.6.3¼ $\frac{7}{13}$

What will a hundred weight of cheese come to, if 2 lb. cost 1s. 6½d. *Ans.* £4.6.4.

If a gallon of Porter cost 2s. 8d., what will half a barrel come to ? *Ans.* £2.8.

If a barrel of beer cost £2.10, what will a butt cost ?
Ans. £7.10.

What will 12000 quills come to, at 8½d. for 60 ?
Ans. £7.1.8.

At 10½d. per lb, what is the price of 7 cheeses, each weighing 26 lb. 10 oz. ? *Ans.* 8.3.0¾ ½⅔ or ¾

If 1¼ oz. of tea cost 6¾, what will 24 lb. cost ?
Ans. £8.12.9½ ½

If 24 lb. of tea cost £8.12.9½⅔, what will 1¼ oz. cost ?
Ans. 6¾d.

Suppose 3 pieces of cloth, each 30½ yards cost £21.7 ; what will ¾ qrs. of a yard cost? *Ans.* 3s. 6d.

I gave 1½d. for 1½ lb. of potatoes what would 2 tons weight cost ? *Ans.* 18.13.4.

If a ton of iron cost £23.6.8, what will 2½ lb. cost?
Ans. 6¼d.

How much will 3 nails of cloth come to, at 4s. 7d. for 2 yds. 3 qr. ? *Ans.* 3¾d.

What is wine a bottle, holding 3 half-pints, at £50 per pipe ? *Ans.* 1s. 5¾d.

What quantity of thread can I buy for 50s. 6d. when 3 lb. cost 8s. 4d. ? *Ans.* 18 lb. 2 oz. $\frac{88}{100}$

term, place the greatest of the remaining terms in the *second* place. If the answer is to be less than the third term, put the least term in the *second* place ; put the remaining term in the *first* place ; multiply the second and third terms together, and divide by the first. It may be proper to observe, that it will often be necessary to reduce the terms to their lowest name, then the first of course must also be reduced to, or be of the same name as the second. Perhaps, however, after all, the old or original method is the better of the two ; but this must be left to the teacher's own choice and usual practice.

If $3\frac{1}{2}$ lb. of green tea cost 28s. 6d., what will half a hundred weight come to?   *Ans.* £22.16.

How much is due to a person for 196 days' service, at a salary of £40 a year?   *Ans.* 21.9.7$\frac{25}{365}$

If I lay by $4\frac{3}{4}$d. a week, what shall I have in 19 weeks, 4 days? .   *Ans.* 7s. 8$\frac{34}{44}$d.

Suppose I receive 11s. 6d. in the pound, for a debt of £59.16.9., what will be the dividend?

Ans. 34.8.1$\frac{1}{2}$ 72.

What will a maid servant's wages amount to in $4\frac{1}{2}$ months if she be hired at 10 guineas a year?

Ans. 3.18.9.

Bought 3 lb. 5 oz. 15 dwt. of silver plate for £11.9.7$\frac{1}{2}$, what did I give per ounce?   *Ans.* 5s. 6d.

How many pounds of sugar at 9$\frac{1}{2}$d. per lb. are equal in value to 24 lbs. of tea at 9s. 6d. per lb.?   *Ans.* 288.

What must I pay my brewer for $3\frac{1}{2}$ barrels of ale, at £5. 10s. per hhd?   *Ans.* £12.16.8.

How many yards of cloth can I purchase for £402.5. if 6 yards cost 28s. 8d.?   *Ans.* 1683 yds. 3 qrs. 1 na.

How much in the pound does an insolvent pay, whose effects amount to £827.14s and his debts to £2136?

Ans. 7s. 9d.

A tradesman compounded with his creditors for paying 6s. 3d. in the pound, what was lost on a debt of £7964?

Ans. £5475.5.

Borrowed of a friend £200 for 10 months, how long ought I to lend him £95 to requite his kindness?*

Ans. 21$\frac{5}{19}$mo.

If a gentleman spend 19s. 6d. a day, and lay by £150 at the year's end, what is his yearly income?

Ans. £505.17.6.

---

* This operation is performed by the Rule of Three Inverse, that is to say, by multiplying 'the first and second terms together, and dividing by the third; unless done by the *second* rule, which obviates 'he distinction.

If a person be taxed £37 . 0 . 10. at 7d. in the pound, what is his rental ? *Ans.* £1270.

If a firkin of butter cost 38s. what will 14½lb. come to ?
Ans. 9s. $10\frac{9}{112}$d.

At 7s. 7¼d. in the pound, what will be the composition of a debt of £430 . 8 . 4. ? *Ans.* £163 . 11 . 2.

What are 40 butts 3 qts. of ale worth, at £5.10 per hhd ? *Ans.* 440 . 1 . 6¼ $\frac{1}{3}'$

If an ounce of silver be valued at 5s. 6d., what would the price of a silver tankard, weighing 1 lb. 10 oz. 10 dwt. 4 gr.? *Ans.* £6 . 3 . 9½ $\frac{96}{480}$

A grocer bought a hogshead of sugar, weighing gross 16 cwt. 1 qr. 10 lb. and was allowed for tare 102 lb. and draft 56 lb.; he gave £21 . 11 . 6 for it; what was the cost per hundred weight? *Ans.* £1 . 8 . 10¾

If £28 . 15 . 6 was paid abroad for a pipe of port wine, and £12 . 14 . 6 for the freight of it to London, besides the queen's duty and other incidental charges, amounting to £49 . 15 . 7; what are 47 gallons of it worth ?
Ans. 34 . 0 . 11½ $\frac{80}{126}$

Estimate the purchase of 26 tubs of butter, each weighing 48½ lb. at 45s. 6d. per cwt, allowing tare 2 lb. per tub and draft in the whole 20 lb. *Ans.* £24 . 3 . 0¼ ⅓

Value 138 stone 5 lb. of beef, at 4s. 2d. per stone, and tell the whole cost, and how it should be sold per lb. to gain 5 guineas by the whole ?
Ans. £28 . 17 . 7¼ value; and 7¼d. per lb.

A tea dealer bought 5 chests of souchong, weighing 57 lb. 7½ oz. each, for £57 . 11 . 8¼; what did it cost per half-ounce ? *Ans.* 1¼.

What will a tax of £900 amount to at 2s. 6d. in the pound ? *Ans.* £112 . 10.

A farm consisting of 400 acres 2 ro. 20 po., is let at 2 guineas an acre; what is the yearly rent of that farm ?
£841 . 6 . 3.

If 14 men perform a piece of work in 6 days, working ten hours a day; in what time will 24 men perform it?
Ans. 3 days 5 hours. (I. P.)

If 74 men had provisions for 35 days, but after 5 days 20 were sent away; how long will the provisions last the remaining 54 men?   *Ans.* 41 days.(I.P.)

If a tailor can make a coat and waistcoat with 3¾ yards of cloth, which is 1½ yd. broad; how many yards will he require to make the same, when the breadth is only 3 qrs.
Ans. 7½ yards. (I. P.)

PRACTICE.

Practice is a short, easy, and ready method of finding the value of goods by taking *aliquot* or even parts,* and is usually adopted by persons engaged in trade and business.

When the price is less than a penny.†

Value 4360 apples at ¼ each?   *Ans.* £4 . 8 . 9.

¼ of a penny (¼) 4260 at ¼
————
12) 1065
————
2,0) 8,8—9
————
Ans. £4 . 8 . 9
————

What are 2460 pears worth, at ½ each?   *Ans.* £5 . 2 . 6.

What are 3000 pens worth, at ¾ each?   *Ans.* 9 . 7 . 6.

---

* An *aliquot part* of any number is such a part as being taken a certain number of times, will exactly make that number.   See the Table, page 122.
† These definitions, it is presumed, will suffice.   A few words of *explanation* on the part of the teacher, will obviate the necessity of ⸱⸱⸱ ⸱repeating long rules, and be less irksome to the young

When the price is just an aliquot part of a shilling.

Find the worth of 3000 tops, at 1d. each. *Ans.* £12 . 10.

1d. of a shilling ($\frac{1}{12}$) 3000 at 1d.

2,0) 25,0

Ans. £12.10

What are 4260 kites worth at 1½d. each? £26 . 12 . 6.

What will 1648 cricket balls come to, at 3d. each?

Ans. £20 . 12.

Value 3692 lb. of moist sugar at 4d. per lb.

Ans. 61 . 10 . 8.

What will 9294 cakes come to, at 6d. each?

Ans. £232 . 7.

When the price is NOT *an aliquot part of a shilling.*

What are 4000 little story books worth at 1¾ each?

Ans. £29 . 3 . 4

1½ of a shilling ($\frac{1}{8}$) 4000 at 1¾

¼ of 1½ ($\frac{1}{6}$) 500

83.4

2,0) 58,3.4

Ans. £29.3.4

Tell the cost of 252 pints of ale at 2½ per pint.

Ans. £2 . 12 . 6.

If a yard of tape cost 4½d. what will 3650 yards cost?

Ans. £68 . 8 . 9.

If 1 pair of worked socks cost 7¼d. what will 300 pair come to? *Ans.* £9 . 1 . 3.

What is the price of 1168 lb. of butter at 10¾d. per lb.?

Ans. £52 . 6 . 4.

When the price is any EVEN *number of shillings under* 20.

What must be charged for 2465 ciphering books, at 2s. each ? *Ans.* £246 . 10.

<div align="center">

2465 at 2s
1

———

Ans. £246 . 10

</div>

Find the cost of 762 pair of shoes, at 4s. per pair. *Ans.* £152 . 8.

What will 2760 lb. of green tea cost, at 8s. per lb ? *Ans.* £1104.

Suppose a gentleman's hat cost 18s., what would 456 come to? *Ans.* £410 . 8.

When the price is any ODD *number of shillings under* 20.

What will 4260 lb. of currants come to, at 1s. per lb. ? *Ans.* £213.

<div align="center">

4260 at 1s.
1

———

2,0) 426,0

———

Ans. £213

</div>

Value 276 pair of cotton hose, at 3s. a pair ? *Ans.* £41 . 8.

If a silk handkerchief cost 5s., what cost 526 ? *Ans.* £131 . 10.

Tell the cost of 8264 waistcoats, at 11s. each ? *Ans.* £4545 . 4.

When the price is any number of shillings and pence.

Find the value of 345 lb. of coffee, at 1s. 8d. per lb. ? *Ans.* £28 . 15.

<div align="center">

1s. 8d, of a pound ($\frac{1}{12}$) 345 at 1s. 8d.

———

Ans. £28 . 15

</div>

What come 458 quires of paper to, at 2s. 6d. per quire ? *Ans.* £57 . 5.

What will 3624 bottles of wine cost, at 4s. a bottle ?
Ans. £724 . 16.

Tell the price of 2437 pair of shoes, at 6s. 8d. per pair.
Ans. £812.6.8.

Find the price of 3026 men's hats at 10s. 6d. each ?
Ans. £1588.13.

10s. of a pound ($\frac{1}{2}$) 3026 at 10s. 6d.

6d. of 10s. ($\frac{1}{20}$) 1513
75 . 13

Ans. £1588 . 13.

What are 8246 yards of broad-cloth worth, at 11s. 3d. a yard?   *Ans.* £4638 . 7 . 6.

Value 7090 yards of muslin, at 5s. 5d. a yard ?
Ans. £1920 .4. 2.

What are 2724 lb. of cocoa worth at 2s. 9d. per lb. ?
Ans. £374 . 11.

What will 1325 stone of meat come to, at 5s. 7½d. per stone ?   *Ans.* 372 . 13 . 1½.

Value 1234 women's gowns, at 19s. 11¾d. each.
Ans. £1232 . 14 . 3¼.

If 1 lady's shawl cost 11s. 10¼d., what cost 7298 ?
Ans. £4325 . 11 . 8½

When the price is pounds, shillings, and farthings.

What will 428 suits of clothes come to, at £7 . 10 . 6. per suit?   *Ans.* £3220 . 14.

s.	£ s. d.	s.	£ s. d.
10 of a Pound ($\frac{1}{2}$) 428 at 7 10 6		Or, as 1 : 7 10 6 : : 428	
7		*Ans.* £3220.14.	

6d. of 10s. ($\frac{1}{20}$) 2996   Or, 428
214   7 $\frac{21}{40}$
10 . 14
                                                  2996
Ans. £3220 . 1   224 . 14

Ans. £3220 . 14

Suppose a silver watch cost £3.15.6, what would 5016 come to? *Ans.* £18,935 . 8.

What would 4261 gold necklaces be worth, at £4.17.9 each? *Ans.* £20,825. 12. 9.

Value 2046 casks of oil, at £8 . 17 . 6 per cask.
Ans. £18,158 . 5.

When there is any ODD *weight or measure in the quantity.*

What do 4280¼ lb. of Souchong tea come to, at 3s. 2d. per lb? *Ans.* £677 . 14 . 1½.

d. of a shilling (⅛) 4280¼ at (¼) 3s. 2d.

$$
\begin{array}{r}
3 \\\hline
\underline{} \quad\quad 0 . 9\tfrac{1}{2} \\
12840 \quad\quad \underline{} \\
713 . 4 \\
9\tfrac{1}{2} \\\hline
2,0) \ 1355,4 . 1\tfrac{1}{2} \\\hline
\end{array}
$$

Ans. £677 . 14 . 1½

Find the price of 519½ yards of calico, at 1s. 6½d. per yard. *Ans.* £40.0.10¾.

What will 3561¾ gallons of tent wine cost, at 12s. 6½d. per gallon? *Ans.* £2233.10.3¼.

What is the value of 97 cwt. 15 lb. of tobacco, at £3.17.10 per cwt?

```
               £  s.  d.
    14⅛       3  17  10 × 1
                    12
              ─────────────
   1 1⁄14   46  14   0
                     8
              ─────────────
           373  12   0
             3  17  10
                 9   8¾
                 0   8
              ─────────────
   Ans. £378  0    3
              ─────────────
```

Or by Proportion.

	lb.		£ s. d.		cwt. qr. lb.
As	112	:	3 17 10	: :	97 0 15

Ans. £378 0 3

Or thus,		Or thus,

cwt. lb.   £ s. d.

14⅛ 97 15 at 17 10   97 ½⁵ at 3 17 10 × 1

1 1/14 77 10   12

```
      679                              46 14  0
      679                                      8
       48  6
       32  4                          373 12  0
                                        3 17 10
     7549 10                              10  5
        9  8¾
        0  8¼              Ans. £378  0  3
```

2,0) 7.56,0 3

Ans. £378   0   3

What are 56 hhds. 2 firk. 6 gal. of Burton ale worth, at £4.11.8 per hhd?   *Ans.* £258.14.0½

Value 132 cwt. 0 qr. 16 lb. of tobacco, at £13.11.8 per cwt.   *Ans.* £1794.18.9½.

If I pay £2.14.1½ for 1 cwt. of coarse sugar, what will 146 cwt. 3 qr. 19¼ lb. come to?   *Ans.* £397.12.1¼.

Bought 94 tuns. 2 hhd. 15 gal. of port wine at £130.8.6 per tun; required the full value.   *Ans.* £12,332.18.6.

What is the price of 128 tons* of straw, at 2½ guineas a load?   *Ans.* £504.

Find the value of 300 barrels of beer, at 19d. a gallon.
                    Ans. £855.

* A ton of straw is equal to a load and a half; consequently 128 tons will make 192 loads.

What must I pay for 12 hogsheads of beer, at 4½d. per quart?   *Ans.* £48.12.

Required the purchase of 78 firkins of butter, at 10½d. per lb., and 48 Gloucester cheeses, each weighing 7¾ lb. at 8d. per lb.

Ans. £191.2 for the butter, and £12.8 for the cheese.

Bought 40 pieces of Russia sheeting, each containing 34½ yards, at 3s. 11½d. per yard; what did the whole cost?
Ans. £273.2.6.

Value 17½ cwt. of sugar at 9¾d. per lb. *Ans.* £79.12.6.

What are 17 hhd. 14 gal. of wine worth, at 3s. 4½d. a pint?   *Ans.* £1464.15.

TARE AND TRET.

Tare and Tret is a rule which points out what deductions * are allowed, when goods are purchased in *wholesale* quantities.

If the gross weight be 49 cwt. 1 qr. 10 lb. and the tare 3 cwt. 2 qr. 18 lb., what is the net weight?
Ans. 45 cwt. 2 qr. 20 lb.

cwt.	qr.	lb.	
49	1	10	gross
3	2	18	tare
Ans. 45	2	20	net

* *Tare* is an allowance to the buyer for the weight of the cask, chest, box, bag, &c. which contains the goods purchased.

Gross signifies the whole weight before any deductions are made.

Draft is a deduction for the turn of the scale, that the weight may hold good, or not be diminished, when the commodity comes to be sold in *retail* quantities.

Net, or *Net Weight,* is what remains when all allowances have been taken off.

Tret and *Cloff* (which are now pretty generally abolished) used to be an allowance of 4 lb. in every 104 lb. for the former, and 2 lb. in every 3 cwt. for the latter.

Suppose the gross weight to be 32 cwt. 2 qr. 14 lb., the tare 116 lb. and the draft 25 lb., how much is the net weight ? *Ans.* 31 cwt. 1 qr. 13 lb.

```
        cwt.  qr.  lb.
         32    2   14 gross
          1    0    4=116 tare
        ─────────────────────
         31    2   10 suttle
                   25 draft
        ─────────────────────
Ans.     31    1   13 net
        ─────────────────────
```

Or in lbs. thus,   Or so,

```
     cwt.  qr.  lb.
      32    2   14                  32 ⎫  The hundreds to
       4                            32 ⎪  be considered as
     ─────                          32 ⎬  lbs., and thus
      130                           32 ⎭  arranged.
       28                           56=2 qr.
     ─────                          14 lb.
     1054                         ─────────
      260                         3654 gross
     ─────                         116 tare
     3654 gross                   ─────────
      116 tare                    3538 suttle
     ─────────                      25 draft
     3538 suttle                  ─────────
       25 draft            Ans.   3513 net wt.
     ─────────                    ─────────
Ans. 3513 lb. net
     ─────────
```

Bought 79 cwt. 20 lb. of tobacco, and was allowed for tare 245 lb., and for draft, 56 lb. ; required the number of net lbs.
Ans. 8567.

What is the net weight of 4 hogsheads of sugar, weighing gross, 68 cwt. 1 qr. 14 lb.; tare, 3 qr. 8 lb. per hhd., and draft, 2 qr. 21 lb. ? *Ans.* 64 cwt. 1 qr. 17 lb.

If the gross weight of 19 bags of goods be 12 cwt. 1 qr. 4 lb. each ; tare, per bag, 15 lb.; and tret for once allowed ; what is the net weight ? *Ans.* 222 cwt. 0 qr. 1 lb.

What is the net weight of 6 bags of hops, each weighing 2 cwt. 1 qr. 4 lb.; tare, 28 lb. per cwt.; and tret as usual?
Ans. 9 cwt. 3 qr. 16 lb.

What is the net weight of 9 frails of raisins, each weighing 3 cwt. 3 qr. 4 lb. gross; tare, 22 lb. per frail; and draft, 6 lb. per frail? *Ans.* 31 cwt. 3 qr. 8 lb.

In 8 jars of oil, each 3 qr. 14 lb. gross; tare, per jar, 12 lb.; and draft 14 lb.; how many net gallons?*
Ans. 89 $\frac{7}{15}$

What is the net weight and value of 17 hhds. of sugar, each weighing 17 cwt. 3 qr. 19 lb. gross; tare, 18 lb. per cwt.; and draft, 1 cwt. 3 qr. 10 lb.; at 97s. 6d. per cwt.?
Ans. weight 253 cwt. 3 qr. 10 lb.—value £1237 . 9 . 3$\frac{3}{4}$

What is the net weight of 7 hhds. of tobacco, each being 5 cwt. 2 qr. 7 lb. gross; tare, 8 lb. per cwt.; tret, 4 lb. per 104 lb.; and cloff, 2 lb. on every 3 cwt.?
Ans. 34 cwt. 2 qr. 8 lb.

Bought 5 hhds. of tobacco weighing as under, viz.,—

	cwt.	qr.	lb.	
No. 1	5	3	17	
2	5	0	27	Tare of each hhd. 100 lb., draft in
3	5	1	26	the whole 36½ lb.; what is the net
4	5	3	27	weight?
5	5	2	0	*Ans.* 23 cwt. 1 qr. 8½ lb.

Sold 57 tubs of butter, each weighing 85½ lb., tare 19 lb. per tub; what is the net weight, and cost of the whole at 10½d. per lb?
Ans. net weight 3790 lb. 8 oz.; value £165 . 16 . 8¼

Find the net weight and full value of the four following cases; namely,

		cwt.	qr.	lb.		
No. 1 weighing	4	1	17	tare 145	draft 4 lb. per case,
2		3	3	21	141	tret 4 lb. per 104 lb.,
3		4	0	6	143	at 3s. 9d. per lb.
4		4	1	11	144	

Ans. 1237 lb.; value £231 . 18 . 9.

* 7½ lbs. of oil make a gallon.

SIMPLE INTEREST.

Simple Interest is to be understood as showing the money allowed by the borrower to the lender for the use of any fixed sum, lent for a certain space of time; which, according to law, must not exceed £5 per cent, per annum; and so on in the same proportionate value.

The *principal* is the money lent; the *rate* is the sum per cent. agreed on for the loan; and the *amount* is the principal and interest added together.*

What is the interest of £149.12.6 for one year, at £5 per cent. ?   *Ans.* £7.9.7½

$$
\begin{array}{rrr}
\pounds & s. & d. \\
149 & 12 & 6 \\
 & & 5 \\
\hline
7,48 & 2 & 6 \\
20 & & \\
\hline
9,62 & & \\
12 & & \\
\hline
7,50 & & \\
4 & & \\
\hline
\tfrac{1}{2},00 & & \\
\hline
\end{array}
$$

What is the interest of £500, for 2 years, at £4½ per cent. per annum ?   *Ans.* £45.

Or thus,

$$
\begin{array}{rr}
\pounds & \\
\tfrac{1}{4} \; (\tfrac{1}{2}) & 500 \\
 & 4 \\
\hline
 & 2000 \\
 & 250 \\
\hline
 & 2250 \\
 & 2 \\
\hline
\pounds & 45,00 \\
\end{array}
\qquad
\begin{array}{rr}
\pounds & \\
10 \; (\tfrac{1}{2}) & 500 \\
 & 4 \\
\hline
 & 2000 \\
 & 250 \\
\hline
 & 22,50 \\
 & 20 \\
\hline
 & 10,00 \\
\end{array}
$$

$$
\begin{array}{rrl}
\pounds & s. & \\
22 & 10 & \text{for 1 year.} \\
 & 2 & \\
\hline
\textit{Ans. } 45 & 0 & \text{for 2 years.} \\
\end{array}
$$

* If the principal be multiplied by the rate per cent., and divided by 100, it will give the interest for one year. The rate and years may be multiplied either successively or separately.

What is the interest of £375.5 for $2\frac{1}{2}$ years at £4$\frac{3}{4}$ per cent.   *Ans.* £44.11.2$\frac{1}{2}$

Tell the amount of £40.10 for 3 years, at $3\frac{1}{2}$ per cent.
                    Ans. £44.15.0$\frac{1}{2}$

What is the interest of £845.10 for a quarter of a year, at 5 per cent ?   *Ans.* £10.11.4$\frac{1}{2}$

What is the interest of 300 guineas for 6 yrs. 8 mo. 20 da.* at $4\frac{1}{2}$ per cent. ?   *Ans.* £95.5.9.

What is the interest of £100 for 27 weeks, 3 days,† at £5 per cent.   *Ans.* £2.12.7.

Find the commission ‡ on £345 at $2\frac{1}{2}$ per cent. ?
                    Ans. £8.12.6.

What is the amount of £362.12.9. from July 7th to Nov. 28th following, at £5 per cent. per annum ?
                    Ans. £369.15.9$\frac{3}{4}$

I demand the brokerage of £152 at 4s. 6d. per cent. ?
                    Ans. 6s.10d.

Tell the amount of £795.13.4 at $3\frac{1}{2}$ per cent., for 6 years.   *Ans.* £962.15.1.

What is the interest of £1000.10.6 for twelve days at 5 per cent. ?   *Ans.* £1.12.10$\frac{1}{2}$

How much must I pay a broker, at $\frac{3}{4}$ per cent, for £11250?   *Ans.* £42.3.9.

* If there be months, weeks, and days, or fractional parts, they must be wrought by the aliquot parts of a year, and added to the rest of the work.

† To find the interest for days and weeks it is usual to work the sum by the Rule of Three; but another rule is, to multiply the sum or principal by the number of days, and divide the product by 365, for the interest in *shillings;* or by 7300 (that is, 365 × by 20), for the interest in *pounds,* which is the readiest way of ascertaining the amount of interest at £5 per cent. per annum. To calculate the interest for days, multiply the principal by the number of days, and by *double the rate* per cent. Add these products and divide the sum by 73000.

‡ *Commission,* as well as what is called *Brokerage,* is an allowance made to a person called a Broker, for disposing or selling of ⸱⸱ds, &c., to the best advantage, whereby he himself derives a profit ⸱iven rate per cent.

At $5\frac{1}{5}$ commission, what must I pay for goods sold to the amount of £327.15.4 ?　　　　　*Ans.* £16.18.9$\frac{1}{4}$

What is the value of £300 of the 3 per cent. stock at 81 per cent. ?　　　　　*Ans.* £243.

Value £7000 East India Stock, at 197$\frac{3}{4}$ per cent. ?　　　　　　　　　　*Ans.* £13816.5.

What is the purchase of £918.14 Bank Stock, at £127$\frac{3}{4}$ per cent. ?　　　　　*Ans.* £1075.

If a factor be allowed $2\frac{3}{5}$ per cent., what does his commission amount to on 1000 guineas ?　　*Ans.* £27.11.3.

If a broker be allowed 5s. 6d. per cent. what will the brokerage amount to on £829.17.6 ?　　*Ans.* £2.5.7$\frac{1}{2}$

What is the cost of £735.15 in the 3 per cent. consols, at 78$\frac{1}{2}$ per cent. ?　　　　　*Ans.* £574.16.1.

What is the amount of £250.10.6 for 40 days, at £3$\frac{1}{2}$ per cent. ?　　　　　*Ans.* 251.9.8$\frac{1}{2}$, 878.

Find the interest of £351 from 5th March to 6th August at £4$\frac{1}{2}$ per cent. ?　　　　　*Ans.* 6.13.3$\frac{1}{4}$

What is the commission of £2000 at $\frac{1}{4}$ per cent. ?　　　　　　　　　　*Ans.* £5.

If I allow a broker $\frac{5}{8}$ per cent, what will his brokerage amount to on £2165.10.6 ?　　*Ans.* £13.10.8$\frac{1}{4}$

What is the insurance* of £195.5 at 10$\frac{1}{2}$ per cent. ?　　　　　　　　　*Ans.* £20.10.0$\frac{1}{4}$ $\frac{1}{5}$

What is the purchase † of £710 South Sea Stock at 103$\frac{5}{8}$ per cent. ?　　　　　*Ans.* £735.14.9.

My correspondent writes me word that he has bought goods on my account to the amount of £954.16.6 ; what does his commission come to at 50s., or 2$\frac{1}{2}$ per cent. ?　　　　　　　　　　*Ans.* £23.17.4$\frac{3}{4}$

* *Insurance* is a protection from damage and loss by fire, risk of ships at sea, &c., for which is paid a certain rate per cent.

† *Purchasing of stock* is the purchasing and disposing of a certain sum of money in the Bank of England.

If £100 stock cost £61.2.6 money, what will £1000 stock cost ? * *Ans.* £612.10

If £100 stock sell for £65.10 what will £575 sell for ?† *Ans.* £375.18.

DISCOUNT.

Discount is the allowing a certain rate per cent. for the payment of money before it becomes due, consequent to what may be agreed on between the parties concerned. ‡

Find the interest and present value of £250 due 9 months hence, at 5 per cent.

£	mo.	£ s.		£ s. d.	
250	6=½	12 10		250 0 0	debt.
5				9 7 6	discount.
	3=¼	6 5			
12,50		3 2 6		240 12 6	present value.
20					
		£9 7 6			
10,00					

Or thus, briefly,

```
            d.
           250
             9
           ───
     12 ) 2250
          ────
     2,0 ) 18,7—6
           ─────
```

Ans. £9 7 6 discount.

---

* Adding one-eighth per cent., or 10 half-crowns, for brokerage.
† Deducting 14s. 4d. for brokerage, which is never less than a shilling.
‡ In the routine of business the usual way now in almost all mercantile and banking houses of calculating the discount of any note or bill is to *deduct* the interest of the sum for the given time at 5 per cent. ; or to reckon a penny a pound for every month the bill has to run.

The following solution appertains to the old method of finding the discount, which in commercial practice has now become obsolete :—

		£	
6	(½)	5	0
3	(½)	2	10
		1	5
		3	15
	Add 100	0	
	£ 103	15	

£ s.   £ s.   £

Then, As 103 15 : 3 15 :: 250   }
Or, As 103 15 : 250 :: 3 15 } £9 . 0 . 8½ discount.

Lastly, £9.0.8½ taken from £250 leaves £240.19.3½, its present value.

Required the discount of £1000 due 70 days hence, at 5 per cent.   *Ans.* £9.11.9½

£		d. £ d.
1000		As 365 : 50 :: 70
5		Or thus, £1000 × 70 ÷ 365 = £9 . 11 . 9½
£50,00		

What is the discount on a bill of £150 which has 60 days to run, at 5 per cent.?   *Ans.* £1.4.8, nearly

COMPOUND INTEREST.

Compound Interest may be defined interest upon interest, since it arises from adding the interest, as it becomes due, to the principal; but money cannot be lent after this manner, although it is allowed in granting or purchasing annuities, leases, or reversions.

What is the compound interest of £700.18 for 2 years, at £5 per cent., per annum ?

£	s.			£	s.	d.	
700	18			700	18	0	
	5			35	0	10¾	
35,04	10			735	18	10¾	1st year's
	20					5	amount.
0,90				36,79	14	5¾	
	12				20		
10,80				15,94			
	4				12		
¾,20				11,33			
					4		
				¼,35			

	£	s.	d.
	735	18	10¾
	36	15	11¼
	772	14	10	2nd year's amount.
	700	18	0	1st year's principal.

Ans. £71 16 10 interest for 2 years.

Or thus,

		£	s.	d.	
5 =	$\frac{1}{20}$	700	18	0	first year's principal.
		35	0	10¾	interest (add).
5 =	$\frac{1}{20}$	735	18	10¾	second year's principal.
		36	15	11¼	interest (add).
		772	14	10	amount.
		700	18	0	first year's principal.

Ans. £71 16 10 interest for two years.

What is the amount of £725 in 2½ years, at 5 per cent. per annum? *Ans.* £819.5.10¾

What is the compound interest of £387.15 for 2¼ years, at 4 per cent. per annum; interest payable quarterly?
Ans. £35.16.8

What will be the compound interest of £650 for 4 years nine months, at 3½ per cent. per annum? *Ans.* £115.9.4¼

Find what 1000 guineas, compound interest, will amount to in 5 years, at £4.10 per cent. per annum.
Ans. £1308.9.9½

VULGAR FRACTIONS.

A fraction is any part or parts of something considered as a whole, and is expressed by two numbers placed one above the other, with a line between them, as ½, ⅔, ¾, &c.

The number above the line is called the *numerator*, and that below it the *denominator*. The first shows how many parts the fraction consists of, and the under figure, how many parts the quantity is divided into.*

To reduce a fraction to its lowest terms.

Reduce $\frac{36}{240}$ to its lowest terms.

```
36 ) 240 ( 6
     216
     ———
    24 ) 36 ( 1
         24
         ——
        12 ) 24 ( 2
             24
             ——
```

$$12) \frac{36}{240} = \frac{3}{20} \; Ans.$$

---

* Fractions are either proper, improper, compound, or mixed.

The *proper* fraction is when the numerator is less than the denominator, as ¼, ¾, ⅓, &c.

An *improper* fraction is when the numerator is equal to, or greater than, the denominator, as ¾, ⅝, ⅚, &c.

A *compound* fraction is simply the fraction of a fraction, as ½ of ⅔ of ¼, &c.

A *mixed* number is that which is composed of a whole number and a fraction joined with it, as 5¼, 14¾, 3¹⁄₁₀, &c.

Reduce $\frac{184}{388}$ to its lowest terms.   *Ans.* $\frac{92}{193}$

Reduce $\frac{432}{556}$ to its lowest terms.   *Ans.* $\frac{108}{239}$

Reduce $\frac{525}{960}$ to its lowest terms.   *Ans.* $\frac{35}{64}$

To reduce a mixed number to an improper fraction.

Reduce $24\frac{5}{8}$ to an improper fraction.

$$24\frac{5}{8}$$
$$8$$

Or thus, $24 \times 8 + 5 = \frac{197}{8}$ *Ans.*

$$\overline{\frac{197}{8}} \; \textit{Ans.}$$

Reduce $38\frac{1}{3}$ to an improper fraction.   *Ans.* $\frac{115}{3}$

Reduce $64\frac{3}{4}$ to an improper fraction.   *Ans.* $\frac{259}{4}$

Reduce $45\frac{4}{5}$ to an improper fraction.   *Ans.* $\frac{229}{5}$

To reduce an improper fraction to its proper terms, or to its equivalent mixed number.

Reduce $\frac{84}{9}$ to its proper or whole terms.

$$9\,)\,84\,(\,9\frac{3}{9}\;\textit{Ans.}$$
$$81$$
$$\overline{}$$
$$\frac{3}{9}$$

Reduce $\frac{48}{5}$ to its proper terms.   *Ans.* $9\frac{3}{5}$

Reduce $\frac{164}{17}$ to its proper terms.   *Ans.* $9\frac{11}{17}$

Reduce $\frac{98}{12}$ to its proper terms.   *Ans.* $8\frac{2}{12}$

To reduce fractions of one denomination to that of another of an equal value.

Reduce $\frac{4}{5}$ of a farthing to the fraction of a pound.*

$$\frac{4}{5} \times \frac{1}{4} \times \frac{1}{12} \times \frac{1}{20} = \frac{4}{4800} = \frac{1}{1200} \;\pounds\; \textit{Ans.}$$

Reduce 16s. to the fraction of a pound.   *Ans.* $\frac{4}{5}$

Reduce 4s. 6d. to the fraction of a pound.   *Ans.* $\frac{9}{40}$

Reduce 7s. $3\frac{1}{2}$d. to the fraction of a shilling.   *Ans.* $7\frac{14}{24}$

---

* If it be a small name to a great, multiply the *denominator*; but if it be a great name to a small, multiply the *numerator*.

Reduce 13s. 8¼ to the fraction of a guinea.   *Ans.* $\frac{713}{112}$

Reduce 2 roods 20 poles to the fraction of an acre.
                                                                    Ans. ⅝

Reduce 2 qrs. 14 lb. 1 oz. to the fraction of a cwt
                                                                    Ans. $\frac{1121}{1792}$

Reduce 6 fur. 16 poles to the fraction of a mile.
                                                                    Ans. ⅘

Reduce 48 gallons to the fraction of a hogshead of beer.
                                                                    Ans. ⅜

Reduce 3 cwt. 2 qr. 8 lb. to the fraction of a ton.
                                                                    Ans. $\frac{5}{28}$

To find the value of a fraction.

What is the value of ⅝ of a pound?

$$\frac{5}{8} \times \frac{20}{1} = \frac{100}{8} = 12\frac{4}{8} \quad \text{s.}$$

$$\frac{4}{8} \times \frac{12}{1} = \frac{48}{8} = 6 \quad \text{d.} \qquad Ans. \text{ 12s. 6d.}$$

What is the value of ⅜ of a guinea?   *Ans.* 7s. 10½d.

What is the value of ⅗ of a crown?   *Ans.* 3s.

What is the quantity of ⅝ of a lb. troy?
                                                                    Ans. 7 oz. 10 dwt.

What is the measure of $\frac{3}{10}$ of a hhd. of beer?
                                                                    Ans. 16 gal. 1$\frac{6}{10}$ pt.

What is the measure of ⅘ of a pipe of wine?
                                                                    Ans. 100 gal. 3½ qt.

What is the space of $\frac{6}{10}$ of a day?
                                                                    Ans. 14 hours, 24 minutes.

What is the distance of $\frac{3}{16}$ of a mile? *Ans.* 1 fur. 20 po.

What is the portion of ⅝ of an acre?
                                                                    Ans. 1 rood 20 poles.

What is the division of ⅗ of a day?
                                                                    Ans. 14 hours 24 minutes.

To reduce fractions of one denomination to fractions of greater denominations, retaining the same value.

Reduce $\frac{2}{3}$ of a penny to the fraction of a pound.

$$\frac{2}{3} \times \frac{1}{12} \times \frac{1}{20} = \frac{1}{1920} \text{ £ } Ans.$$

Reduce $\frac{1}{4}$ of a shilling to the fraction of a pound.

$Ans.$ $\frac{5}{120}$

Reduce $\frac{4}{5}$ of a yard to the fraction of a mile. $Ans.$ $\frac{4}{8800}$

Reduce $\frac{3}{4}$ of a crown to the fraction of a pound.

$Ans.$ $\frac{3}{16}$

Reduce $\frac{5}{6}$ of a farthing to the fraction of a guinea.

$Ans.$ $\frac{5}{6048}$

Reduce $\frac{5}{8}$ lb. to the fraction of a ton. $Ans.$ $\frac{1}{3688}$

Reduce $\frac{9}{7}$ oz. to the fraction of a cwt. . $Ans.$ $\frac{3}{3272}$

Reduce $\frac{1}{1480}$ of a ton to the fraction of a lb. $Ans.$ $\frac{1}{2}$

Reduce $\frac{5}{9}$ of a gallon to the fraction of a butt. $Ans.$ $\frac{2}{756}$

Reduce $\frac{1}{12}$ of an inch to the fraction of a mile.

$Ans.$ $\frac{1}{760320}$

Reduce $\frac{1}{360}$ of a pound to the fraction of a penny.

$Ans.$ $\frac{2}{3}$

Reduce $\frac{2}{5}$ of a pennyweight to the fraction of a lb.

$Ans.$ $\frac{1}{400}$

ADDITION OF VULGAR FRACTIONS.

Make the fractions all alike, and reduce them to a common denominator; then add the numerators together, and under the same place the common denominator.

Add $\frac{3}{4}$, $\frac{5}{8}$, and $\frac{6}{7}$ together.

$$3 \times 8 \times 7 = 168$$
$$5 \times 4 \times 7 = 140$$
$$6 \times 4 \times 8 = 192$$

$$\overline{500}$$

$$\frac{500}{\ } = 2\frac{52}{224} \; Ans.$$

$$4 \times 8 \times 7 = 224$$

Or thus,

$$\frac{168 \times 140 \times 192}{224} = \frac{500}{224} = 2\frac{52}{224} \ Ans.$$

Find the value of $\frac{1}{4}$, $4\frac{1}{3}$, and $\frac{2}{3}$. *Ans.* $5\frac{1}{4}$

Add $3\frac{1}{5}$, and $\frac{2}{3}$ of $\frac{1}{6}$ together. *Ans.* $3\frac{9}{90}$

What is the sum of $5\frac{1}{2}$, $6\frac{7}{8}$, and $4\frac{3}{4}$? *Ans.* $17\cdot\frac{1}{8}$

Add $\frac{2}{5}$, $\frac{7}{8}$, and $\frac{9}{10}$ together. *Ans.* $2\frac{7}{40}$

To $\frac{1}{8}$ of a pound add $\frac{2}{3}$ of a shilling.

$\frac{5}{8} \times \frac{20}{1} = \frac{100}{8} = 12\frac{1}{2}$s.

$\frac{1}{2} \times \frac{12}{1} = \frac{12}{2} = 6$d. $\frac{2}{3} \times \frac{12}{1} = \frac{24}{3} = 8$d.

s.	d.	
12	6	$= \frac{5}{8}$ of a pound.
0	8	$= \frac{2}{3}$ of a shilling.

Ans. 13   2

What is the sum of $\frac{5}{8}$ of a £, $\frac{3}{4}$ of a shilling, and $\frac{2}{3}$ of a sixpence ? *Ans.* 11s. $11\frac{3}{4}\frac{7}{9}$d.

Required the sum of $\frac{2}{7}$ of £15, $3\frac{2}{7}$ of a £., $\frac{1}{3}$ of $\frac{4}{7}$ of $\frac{3}{5}$ of a £, and $\frac{2}{3}$ of $\frac{3}{7}$ of a shilling. *Ans.* £7.17.$5\frac{4}{7}$

Add together $\frac{3}{4}$ of a foot, $\frac{2}{3}$ of a yard, and $\frac{1}{8}$ of a mile. *Ans.* 1540 yds. 2 ft. 9 in.

What is the sum of $\frac{3}{4}$ of a hogshead of beer, and $\frac{3}{3}$ of a barrel ? *Ans.* 62 gal. $\frac{4}{5}$ pt.

Add together $\frac{3}{16}$ of a cwt. $\frac{5}{7}$ of a qr., and $\frac{9}{11}$ of a lb. ? *Ans.* 1 qr. 13 lb. 13 oz. 1 dr. $\frac{5}{11}$

What is the sum of $\frac{5}{12}$ of a ton, and $\frac{9}{11}$ of a cwt. ? *Ans.* 9 cwt. 16 lb. 15 oz. $\frac{17}{33}$

Add $\frac{2}{3}$ of a day, and $\frac{5}{24}$ of an hour together. *Ans.* 16ho. 12 min. 30 sec.

SUBTRACTION OF VULGAR FRACTIONS.

Prepare the fractions as in Addition ; then subtract **the** less numerator from the greater, and place the remainder over the common denominator.

Take $\frac{3}{8}$ from $\frac{3}{5}$?

$$7 \times 5 = 35$$
$$3 \times 8 = 24$$
$$\overline{11} \; Ans.$$
$$8 \times 5 = 40$$

Or thus,

$$\frac{35-24}{40} = \frac{11}{40} \; Ans.$$

Take $\frac{5}{8}$ from $\frac{9}{10}$.	*Ans.* $\frac{11}{40}$
What is the difference of $\frac{3}{4}$ and $\frac{5}{9}$?	*Ans.* $\frac{7}{36}$
From $\frac{2}{3}$ of 9, take $1\frac{1}{2}$.	*Ans.* $2\frac{2}{15}$
From 60 take $\frac{5}{7}$ of 60.	*Ans.* $17\frac{1}{7}$
From $19\frac{1}{2}$ take $\frac{1}{3}$ of $\frac{4}{5}$ of $8\frac{1}{4}$.	*Ans.* $13\frac{8}{60}$
From $\frac{3}{4}$ cf a £ take $\frac{2}{3}$ of a shilling.	*Ans.* 14s. $7\frac{1}{3}$d.
From $\frac{4}{9}$ of a guinea take $\frac{1}{3}$ of a £.	*Ans.* 5s. 4d.
From $\frac{5}{7}$ of a ton take $\frac{1}{2}$ of $\frac{4}{5}$ of a cwt.	

Ans. 13 cwt. 3 qr. 18 lb.

Take $\frac{5}{7}$ of $\frac{4}{8}$ of £5 from 100 half-crowns.

Ans. £11 . 12 . $1\frac{3}{4}$

From $\frac{4}{5}$ of a league take $\frac{7}{10}$ of a mile.

Ans. 1 mi. 2 fur. 16 po.

MULTIPLICATION OF FRACTIONS.

Let the fractions be prepared as before ; then multiply all the numerators together for the numerator of the product, and all the denominators for the denominator.

Multiply $\frac{7}{8}$ by $\frac{9}{10}$. $\quad \frac{7 \times \ 9 = 63}{8 \times 10 \ \ 80}$ *Ans.*

Multiply $\frac{4}{5}$ by $8\frac{3}{4}$. $\qquad\qquad\qquad$ *Ans.* $6\frac{7}{10}$

Multiply 14 by $4\frac{3}{4}$. $\qquad\qquad\qquad$ *Ans.* $66\frac{1}{2}$

Multiply $\frac{1}{2}$ by $4\frac{1}{4}$. $\qquad\qquad\qquad$ *Ans.* $2\frac{1}{8}$

Multiply $48\frac{1}{4}$ by 7. $\qquad\qquad\qquad$ *Ans.* $337\frac{3}{4}$

Multiply $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{5}{4}$ of $2\frac{1}{7}$. $\qquad\qquad$ *Ans.* $\frac{45}{56}$

Multiply 14 yards at $\frac{11}{20}$£. $\qquad\qquad$ *Ans.* £3.17.0

Multiply $17\frac{5}{18}$ of a cwt. by $3\frac{7}{8}$. $\qquad$ *Ans.* $278\frac{51}{144}$

DIVISION OF VULGAR FRACTIONS.

Prepare the fractions as in the former rules ; then *invert* the divisor, and proceed as in Multiplication.

Divide $\frac{3}{5}$ by $\frac{4}{5}$.
$$\tfrac{3}{5} \div \tfrac{4}{5} = \tfrac{15}{20} = 1\frac{7}{20} \ Ans.$$

Divide $3\frac{1}{8}$ by $9\frac{1}{2}$. $\qquad\qquad\qquad$ *Ans.* $\frac{1}{8}$

Divide $15\frac{2}{3}$ by $\frac{7}{8}$ of $\frac{3}{11}$. $\qquad\qquad$ *Ans.* $65\frac{5}{27}$

Divide 9 by $\frac{2}{3}$. $\qquad\qquad\qquad\qquad$ *Ans.* $13\frac{1}{2}$

Divide $\frac{1}{7}$ of $\frac{2}{3}$ of 18 by $\frac{5}{8}$ of $\frac{7}{10}$. $\qquad$ *Ans.* $2\frac{600}{735}$

Divide $14\frac{3}{4}$ by $\frac{2}{3}\frac{1}{5}\frac{1}{5}$. $\qquad\qquad\qquad$ *Ans.* $18\frac{643}{964}$

Divide $456\frac{1}{7}$ by $3\frac{1}{2}$. $\qquad\qquad\qquad$ *Ans.* $130\frac{16}{49}$

Divide $17\frac{9}{16}$ miles by $\frac{4}{5}$ of 3. $\qquad\qquad$ *Ans.* $13\frac{19}{64}$

Divide a prize of £2450$\frac{1}{4}$ into $40\frac{2}{3}$ shares.
$\qquad\qquad\qquad\qquad\qquad\qquad$ *Ans.* £60.12.11.

Divide $8\frac{3}{5}$ by $\frac{1}{2}$ of $\frac{4}{5}$ of 5. $\qquad\qquad$ *Ans.* $4\frac{3}{10}$

Divide 16 by 24. $\qquad\qquad\qquad\qquad$ *Ans.* $\frac{2}{3}$

THE RULE OF THREE IN VULGAR FRACTIONS.

Prepare the fractions, if required, so that they may be of the same name ; state the question just like the Rule of Three in whole numbers ; multiply the second and third

terms together, and also divide the first with its parts *inverted;* and the product will be the answer in the same denomination in which the second term was left.

If $\frac{3}{4}$ yd. cost £$\frac{7}{9}$, what will 5$\frac{1}{4}$ yds. cost? *Ans.* £5. 8. 10$\frac{1}{2}$ $\frac{2}{3}$

$$\frac{3}{4} \; : \; \frac{7}{9} :: \frac{\overset{\displaystyle 5\frac{1}{4}}{\underset{}{\underline{\displaystyle 4}}}{\underline{21}}}{4} = \frac{588}{105} = £5. 8. 10\frac{1}{2}\,\frac{2}{3}$$

If $\frac{5}{6}$ of a gallon of wine cost £$\frac{5}{8}$, what will $\frac{5}{9}$ of a tun cost? *Ans.* £105

If 1 anker of brandy cost £21$\frac{3}{8}$, what will a hhd. cost? *Ans.* £136. 4. 9.

Received for $\frac{1}{4}$ of a cwt. of lead 24$\frac{3}{8}$s., how much should 8$\frac{3}{8}$ cwt. come to? *Ans.* £40. 16. 6$\frac{3}{4}$

If 6 dozen lbs. of candles cost £3$\frac{1}{4}$, what will be the price of 1 lb? *Ans.* 10$\frac{1}{4}$d. $\frac{1}{2}\frac{9}{1}$

If $\frac{1}{8}$ of a ship cost £445. 15, what will $\frac{7}{12}$ of her be worth? *Ans.* £2080. 3. 4.

If 1$\frac{4}{7}$lb. of gold be worth £61$\frac{4}{7}$ sterling, what must be charged for 2 grains? *Ans.* 3d.

If a stationer bought 4$\frac{1}{2}$ quires of foolscap at 4$\frac{1}{4}$d. a quire, what are 15$\frac{3}{4}$ reams worth at the same rate? *Ans.* £5. 15. 1$\frac{1}{2}$

How many lbs. of tobacco can be purchased for £15$\frac{3}{6}$, at the rate of 28$\frac{3}{4}$s. per cwt? *Ans.* 1207 lb. 10 oz. 6 dr.

If 9 men can perform a piece of work in 15$\frac{3}{4}$ days, in what time will 23 men do the same? *Ans.* 6$\frac{4}{6}\frac{5}{3}$

If I have 7$\frac{13}{19}$ cwt. carried for 8s. 7$\frac{1}{2}$d., what weight can I have carried for £5$\frac{5}{16}$? *Ans.* 94 cwt. 2 qrs. 17 lb. $\frac{3867}{9333}$

If 1 yard of broad cloth cost 15$\frac{5}{8}$s., what will 4 pieces, each containing 27$\frac{3}{8}$ yards, come to? *Ans.* £85. 10. 11$\frac{1}{4}$

DECIMAL FRACTIONS.

Decimal Fractions are such as have a unit for their denominator, with as many noughts or ciphers annexed as there are figures in the numerator; as $\frac{2}{10}$, $\frac{34}{100}$, $\frac{564}{1000}$, usually written with a point prefixed without the denominator: thus, ,2, ,34, ,564, which we read in this manner, ,2—2 tenths, ,34—thirty four hundreth parts, ,564—five hundred and sixty four thousand parts; and so on.*

ADDITION OF DECIMALS.

What is the sum of £3,15, £2,031, £;4085, £30,67, and £,0014?

$$
\begin{array}{r}
3,15 \\
2,031 \\
,4085 \\
30,67 \\
,0084 \\
\hline
£36,2679 \; Ans.
\end{array}
$$

What is the total quantity of 2,64 yds., 85,6 yds., ,945 yds., 14,8 yds., ,3456 yds., and 84 yds.?

Ans. 188,3306.

Add up 23, ,1817, 5,5, 84621, ,00010, 38,472, and 3,816.   *Ans.* 84691,96980.

SUBTRACTION OF DECIMALS.

Take £,8495 from £3,6954.

$$
\begin{array}{r}
£ \\
3,6954 \\
,8495 \\
\hline
£2,8459 \; Ans.
\end{array}
$$

* Ciphers on the right hand of decimals do not alter their value.

What is the difference betweeh 246, and £,8154 ?
Ans. 245,1846.

If I borrow £20,78125, and pay in part £14.18.9, what sum remains due ? *Ans.* £5.16.10½.

Find the difference between 40 yds. 2 qrs. of cloth, and 29,652 yds. *Ans.* 10 yds. 3 qr. 2 na.

MULTIPLICATION OF DECIMALS.

Multiply as in whole numbers, only taking care to point off as many decimal places in the product towards the right hand as there are decimals in the multiplier and multiplicand; and if the product be not so many, supply the defect by putting ciphers on the *left hand*.

Multiply ,124 by ,165, and 2,45 by 15,4.

```
        ,124              2,45
        ,165              15,4
        ----              ----
        620               980
        744              1225
        124               245
        ----             -----
    ,020460 Ans.     37,730 Ans.
```

Multiply 346,549 by 3,15. *Ans.* 1091,62935.

Multiply ,84615 by ,0C5. *Ans.* ,05499975.

Multiply 3,081 by 4,12. *Ans.* 12,69372.

Multiply 7,001 by ,001. *Ans.* ,007001.

Multiply 1008, by ,1008. *Ans.* 101,6064.

Multiply ,83125 by the number of days in a year.
Ans. 303,40625

DIVISION OF DECIMALS.

Divide as in whole numbers, and point off as many

decimal places in the quotient, as the dividend has more than the divisor.*

Divide 24,694 by ,45.

```
        ,45 ) 24,694 ( 54,8+ Ans.
               225
               ---
               219
               180
               ---
               394
               360
               ---
               34
               ---
```

Divide 27,462837 by 4,35.   *Ans.* 6,3132 ±1⁷

Divide ,75 by 8.   *Ans.* ,09375

Divide ,382 by ,347   *Ans.* ,110086+

Divide 1, by ,1.   *Ans.* 10.

Divide ,08548 by 215.   *Ans.* ,00030 ²²

Divide ,21468 by 2,5.   *Ans.*,0858 ¹²

~~~~~~~~~~~~~~~

REDUCTION OF DECIMALS.

To reduce a vulgar fraction to a decimal.

What is the decimal of ½, ½ and ¾ ?

```
     4 ) 1,00        2 ) 1,0        4 ) 3,00
        ----            ---            ----
    Ans. ,25        Ans. ,5        Ans. ,75
        ----            ---            ----
```

* If there are not as many decimal places in the quotient as required, supply the defect by writing ciphers on the left hand.

If there be a remainder, the quotient may be carried to any degree of exactness by annexing ciphers ; or if the decimal places in the divisor be more than those in the dividend, ciphers may be annexed to the dividend.

If the dividend will not contain the divisor, ciphers must be added thereto.

What is the decimal of $\frac{1}{8}$?   *Ans.* ,125
What is the decimal of $\frac{5}{8}$.   *Ans.* ,625.
Reduce $\frac{9}{12}$ to a decimal.   *Ans.* ,75.
Reduce $\frac{7}{12}$ to a decimal.   *Ans.* ,583 +

If the number given consist of several denominations.
Reduce 15s. 6¾d. to the decimal of a pound sterling.

s.	d.	£	s.
15	6¾	1 or 20	Or thus, more concisely,
12		12	4) 3,00
——		——	——
186		240	2) 6,75
4		4	——
——		——	2,0) 15,5625
747		960	——————
——		——	,778125 £ *Ans.*

Then, 747 divided by 960 = ,778125 £ *Ans.*
Reduce 17s. to a decimal.   *Ans.* ,85.
Reduce 8s. 4d. to a decimal.   *Ans.* ,4166 +
Reduce 9d. to the decimal of a pound.   *Ans.* ,0375 £
Reduce 5 cwt. 2 qr. 10 lb. to the decimal of a ton.
                                                 Ans. ,2794 +
Reduce 2 qr. 14 lb. to the decimal of a cwt.   *Ans.* ,625.
Reduce 2 gal. 1 qt. of beer to the decimal of a barrel.
                                                 Ans. ,0625.
Reduce 52 days to the decimal of a year.
                                     Ans. ,14   +
Reduce 3 qrs. 3 na. to the decimal of an English ell.
                                                 Ans. ,75

To find the value of any decimal.
What is the value of ,525 of a pound ?   *Ans.* 10s. 6d.

                      ,525
                       20
                    ————
                    10,500
                       12
                    ————
                     6,00
                    ————

What is the value of ,8475 of a pound ?

Ans. 1 €ѕ. 11¼d.

What is ,6845 of a cwt. ?　*Ans.* 2 qr. 20 lb. 10 oz. 9 dr.

What is ,03125 of a barrel of beer　?　*Ans.* 1 gal. 1 pt.

What is the length of ,28 of a mile ?

Ans. 2 fur. 9 po. 3 yd. 10 in. 2 b. c.

What is the measure of ,251 of an acre ?

Ans. 1 r. 4 yd. 7 ft.

THE RULE OF THREE IN DECIMALS.

If 1,25 yards of cloth cost ,625 £, what cost 30¾ yards ?

yds.		£		yds.		
If 1,25	:	,625	::	30,75		4) 3,00
				,625		——
				———		,75
				15375		——
				6150		
				8450		
				———	£	
		,25)	19,21875	(15,375		
			125		20	
			——		——	
			671		7,500	
			125		12	
			——		——	
			468		6,000	
			375		——	
			——			
			937			
			875			
			——			
			625			
			625			
			——		*Ans.* £15 . 7 . 6.	

How many pounds of tea will £30 purchase at 11,125s. for 2 lb.　　　　　　　　　　*Ans.* 107,865.

If $\frac{1}{4}$ lb. of silk cost 8s. 6d., what will 20,5 lb. cost?
                                    Ans. £34,85.

If 3 bushels of wheat cost £1,1, what will 33,4 qrs. come to?   *Ans.* £97,97.

If for 4 weeks' salary I receive £5,825, how much do I have annually?   .   *Ans.* £75,725.

What must my income be to enable me to spend daily 15s. 6d., and lay by at the year's end £123,55?
                                    Ans. £616,5.

How much pepper at 1s. $4\frac{1}{2}$d. per lb. can I buy for £12.15.9?   *Ans.* 1 cwt. 2 qr. 18 lb.

If 1 ounce of silver cost 5s. 6d., what is the price of a tankard that weighs 1 lb. 10 oz. 10 dwt. 4 gr.?
                              Ans. £6.3.$9\frac{1}{2}$ $\frac{1991}{2}$

If $26\frac{1}{2}$ yards of linen cost £3.16.3, what will $32\frac{1}{4}$ yards come to?   *Ans.* £4.12.$9\frac{1}{2}$ $\frac{1504}{}$

A merchant bought 3 cwt. 1 qr. 14 lb. of sugar at £,034375 per lb., and sold it in wholesale for £16,5375 : what did he gain or lose by the bargain, and at how much per cent.? *Ans.*—He gained £3.10.$10\frac{1}{2}$—per cent., £27 $\frac{3}{11}$

EXTRACTION OF THE SQUARE ROOT.

Divide the given numbers into periods of *two* figures each, beginning at the right hand, and pointing towards the left in integers, and towards the right hand in decimals Every period will give one figure in the root.*

What is the square root of 144?

$$\dot{1}\dot{4}4\ (\ 12\ Ans.$$
$$1$$
$$\overline{}$$
$$22\ )\ .44$$
$$44 \qquad \text{Proof, } 12 \times 12 = 144.$$
$$\overline{}$$

* The method of solving the sums will be better explained by the teacher, either from his own *practical* knowledge, or from the rules of instruction laid down by some judicious and experienced writer. The same observation will hold good as to *Cube Root*, and answer the end more effectually.

What is the square root of 40804 ?   *Ans.* 202.

What is the square root of 125316 ?   *Ans.* 354.

What is the square root of 59049 ?   *Ans.* 243.

What is the square root of 2187441 ?   *Ans.* 1479.

What is the square root of ,2916 ?   *Ans.* ,54.

What is the square root of 42,1685 ?   *Ans.* 6,49 $\frac{484}{}$

What is the square root of ,0064.   *Ans.* ,08.

To find the square root of a vulgar fraction.

What is the square root of $\frac{1875}{3675}$?

$$75) \frac{1875}{3675} = \frac{25}{49} \quad \sqrt{\frac{25}{49}} = \frac{5}{7} \; Ans.$$

What is the square root of $\frac{2048}{2888}$?   *Ans.* $\frac{6}{7}$

What is the square root of $\frac{2704}{4225}$?   *Ans.* $\frac{4}{5}$

To find the square root of a mixed number.

What is the square root of $6\frac{19}{25}$?

$$6 \; \tfrac{19}{25}$$
$$25$$

$$\overline{ \frac{169}{25}} = \frac{13}{5} \div 2\frac{3}{5} \; Ans.$$

What is the square root of $9\frac{43}{49}$?   *Ans.* $3\frac{1}{7}$

What is the root of $\frac{289}{576}$?   *Ans.* $\frac{17}{24}$

APPLICATION.

In a square plantation containing 505995 trees, each 6 feet distant, what is the length of the side ?
     Ans. 4268 feet, nearly.

A gentleman has two fields, the first contains 8 ac. 2 r. 1 p., the second, 6 ac. 2 r.; he wishes to exchange them for a square field; required the side of the square.
     Ans. 49 poles.

A person has two circular ponds in his pleasure ground, the diameter of the one is 200 feet, and the other three times as large; what is its diameter ?   *Ans.* 346,4 $\frac{104}{}$

EXTRACTION OF THE CUBE ROOT.

Divide the given numbers into periods of *three* figures each, beginning at the right hand in the integers or whole numbers, and pointing towards the left; but in decimals, begin at the place of thousands, and point towards the right.

What is the cube root of 1728 ?

$$1728 \ (\ 12 \ \textit{Ans.}$$
$$1 = \text{cube of } 1$$

Sq. of $1 \times 3 = 3$) . 728 resolvend.

$$8 = \text{cube of 2 in the quotient.}$$
$$12 \ = 1 \times 3 \times \text{ by sq. of 2.}$$
$$6 \ \ = \text{divisor} \times \text{ by 2.}$$

$$728$$

Proof $12 \times 12 \times 12 = 1728.$

Required the cube root of 48228544.	*Ans.* 364.
What is the cube root of 5735339 ?	*Ans.* 179.
Find the cube root of 12821119155125.	*Ans.* 23405.
What is the cube root of 12,977875 ?	*Ans.* 2,35 +
What is the cube root of 14706,125 ?	*Ans.* 24,5.
What is the cube root of 444194947 ?	*Ans.* 763.
What is the cube root of $37 \frac{1}{27}$?	*Ans.* $3\frac{1}{3}$
What is the cube root of $1953\frac{1}{8}$?	*Ans.* $12\frac{1}{2}$
What is the cube root of $\frac{13824}{42875}$?	*Ans.* $\frac{24}{35}$

APPLICATION.

If a cubical piece of timber be 47 inches long, 47 inches broad, and 47 inches deep; how many cubical inches does it contain ?   *Ans.* 103823.

There is a cellar dug that is 12 feet every way, in length, breadth, and depth; how many solid feet of earth were taken out of it ?   *Ans.* 1728.

There is a stone of a cubic form which contains 389017 solid feet; what is the superficial content of one of its sides? *Ans.* 5329.

DUODECIMALS.

Duodecimals, or, as it is usually called, *Cross Multiplication,* is a rule used by workmen and artificers in calculating the content of their work; the length, breadth, and depth, being given in feet, inches, seconds, thirds, &c.*

> Feet × by feet give feet.
> Feet × by inches give inches.
> Feet × by seconds give seconds.
> Inches × by inches give seconds.
> Inches × by seconds give thirds.
> Seconds × by seconds give fourths.

> 2 Fourths = 1 third.
> 2 Thirds = 1 second, or part.
> 12 Seconds = 1 inch.
> 12 inches = 1 foot.

Multiply 6 feet 3 inches by 3 feet 3 inches.

ft.	in.			ft.	in.				ft.	in.	
6	3		Or,	6	3		Or, 3= ¼		6	3	
3	3				3	3				3	
18	9			1	6	9			18	9	
1	6	9		18	9				1	6	
Ans. 20	3	9	*Ans.* 20	3	9		*Ans.* 20	3	9

* Place the multiplier under the multiplicand, feet under feet, inches under inches, seconds under seconds, &c.; and then proceed according to the rule which may be laid before you, or by the *verbal* directions of your tutor.

E 3

Or thus, *fractionally*.   Or thus, *decimally*.

| 6¼ | 3¼ |
| 4 | 4 |

$$\frac{25}{4} \times \frac{13}{4} = \frac{325}{16} = 20\frac{5}{16} \text{ feet.}$$

Then, $\frac{5}{16} \times \frac{12}{1} = \frac{60}{16} = 3\frac{12}{16}$ in.

$\frac{12}{16} \times \frac{12}{1} = \frac{144}{16} = 9$ pts

Ans. 20 ft. 3 in. 9 pts.

```
      6,25
      3,25
     ------
      3125
      1250
      1875
    -------
   20,3125
        12
    -------
    3,7500
        12
    -------
    9,0000
```

Ans. 20 ft. 3 in. 9 pts.

Multiply 7 feet 6 inches by 4 feet 9 inches.

Ans. 35 ft. 7 in. 6 pts.

Multiply 3 ft. 6 in. by 2 ft. 7 in.   *Ans.* 9 ft. 0 in. 6 pts.

Multiply 6 ft. 3 in. by 3 ft. 2 in.   *Ans.* 19 ft. 9 in. 6 pts.

Multiply 6 ft. 4 in. 3 pts. by 4 ft. 3 in. 6 pts.

Ans. 27 ft. 3 in. 2 p. 10 th. 6 fourths.

Multiply 56 ft. 1 in. 4 pts. by 48 ft. 3 in. 6 pts.

Ans. 2709 ft. 8 in. 4 s. 8 th.

MENSURATION.*

Mensuration is of three kinds, lineal, superficial, and solid :—

Lineal respects length only.

Superficial includes length and breadth.

Solid comprehends length, breadth, and depth.

* Artificers' work is computed by different measures viz. :—
  Glazing, and Masons' flat work, by the foot.
  Painting, plastering, paving, &c., by the yard.
  Partitioning, flooring, roofing, tiling, &c., by the square of 100 feet.
  Brickwork, &c., by the rod, or 16½ feet, whose square is 272¼ feet, which is reckoned a rod of walling.

GLAZIERS' WORK.

What will a piece of glass that is 7 ft. 4 in. long, and 5 ft. 6 in. broad, come to at 6s. per square foot?

ft.	in.			ft.	in.				ft.	in.
7	4		Or, 7	4		Or, 6 = ½	7	4
5	6			5	6				5
36	8			3	8	0			36	8
3	8	0	36	8					3	8
40	4	0	40	4	0				40	4

Or thus,

ft.			s.			£.	s.	d.
40		4 (¼)	6		4 (¼)	0	6	0
6								10
240			*2			3	0	0
	2* add.							4
2,0) 24,2						12	0	0
							2	
Ans. £12	2					*Ans.* £12	2	0

If a pane of glass be 2 ft. 3 in. long, and 1 ft. 6 in. broad, how many feet does it contain?   *Ans.* 3 ft. 4 in. 6 pts.

What is the worth of 8 squares of glass, each measuring 4 ft. 10 in. long, and 2 ft. 11 in. broad, at 4½d. a foot?
Ans. £2.2.3½

There are 8 windows to be glazed, each measuring 1 ft. 6 in. wide, and 3 ft high; how much will they come to at 7¾d. per foot?   *Ans.* £1.3.3.

A house having 24 windows, each measuring 1 ft. 6 in. 3 pts. wide, and 3 feet high, how much will they come to at 2s. 4d. per foot?   *Ans.* £12.15.6.

What is the worth of 16 squares of glass work, each measuring 4 ft. 10 in. long, and 2 ft. 11 in. broad, at 18d. per foot?   *Ans.* £16.18.⸍

A house with three rows of windows, 5 in a row; the height of the first is 5 ft. 6 in., the second, 5 ft. 3 in., and the third, 4 ft. 9 in. ; the breadth is 2 ft. 6 in. ; required the number of feet, and the expence of glazing at $9\frac{1}{2}$d. per square foot.

Ans. Content, 198 ft. 9 in.—expence, £7.13.$4\frac{1}{4}$ $\frac{1}{2}$

MASON'S WORK.

What is the price of a marble slab 5 ft. 7 in. long, and 1 ft. 10 in. broad, at 6s. per foot ?   *Ans.* £3.1.5.

What will be the cost of a grave-stone, the length being 6 ft. 6 in. and the breadth, 3 ft. 3 in., at 4s. 6d. per foot ?
Ans. £4.15.0$\frac{3}{4}$

What will it cost to pave a kitchen which measures 12 ft. 6 in. by 10 ft. 4 in. at 12s. 6d. per foot ? *Ans.* £80.14.7.

How many square feet of paving in a court yard 68 ft. 4 in. by 60 ft. 6 in. ; and what will it come to at 3$\frac{1}{4}$d. the square yard ?

Ans. 4134 ft. 2 in. the content; and the cost, £6.4.$4\frac{3}{4}\frac{11}{34}$

What is the value of a block of marble 12 ft. long, 10 ft. broad, and 7 ft. thick, at 14s. per solid foot ?   *Ans.* £588.

How many rods of mason-work in a wall 50$\frac{1}{2}$ feet long, and 24$\frac{1}{4}$ high ; and what will it cost at 40s. per rod ?

Ans. Content, 3 r. 28 yd. 7$\frac{1}{2}$ in.; cost, £7.11.2$\frac{1}{4}$ $\frac{1}{17}$

PAVIOURS', PAINTERS', AND PLASTERERS', &c., WORK.

What will the paving of a court-yard come to at 4$\frac{3}{4}$d. a yard, the length being 58 ft. 6 in., and breadth, 54 ft. 9 in ?
Ans. £7.0.10$\frac{1}{4}$, 810 remdr.

What should a painter charge for painting a room, the walls of which were 8 ft. high, the room 18 ft. by 14 ft., ceiling included, at 2s. 8d. per yard ?   *Ans.* £11.6.4$\frac{1}{4}$

How many yards of plastering in the roof and walls of a room, 32 ft. 6 in. long, 16 ft. 6 in. broad, and 9 ft. 3 in. high, deducting a door 6 ft. 6 in. by 9 ft. ; and what will

be the content and cost, if charged at $4\frac{1}{2}$d. the square yard?   *Ans.* 158 yds. 1 ft.—£2.19.$3\frac{1}{2}$ $\frac{1}{2}$

What will a piece of wainscoting cost at 6s. $7\frac{1}{2}$d. per yard, which measures 8 ft. 3 in. by 6 ft. 6 inches?
$$Ans. £1.19.5\tfrac{1}{2}$$

What shall I pay a person for painting the outside and inside of a large box 7 ft. 4 in. long, 4 ft. 8 in. wide, and 3 ft. 10 in. deep, at $8\frac{1}{2}$d. a yard?   *Ans.* £1.5.3

What will the paving of a court of a rectangular form cost at 3s. 2d, a yard; supposing the length 27 ft. 10 in., and the breadth, 14 ft. 9 in. deep?   *Ans.* £7.4.$4\frac{3}{4}$

What will the paving of a street come to at 6d. per yard, the length of the street being $176\frac{1}{2}$ feet, and the breadth, $56\frac{3}{4}$ feet?   *Ans.* £27.16.$5\frac{1}{2}$

What am I to pay to a man for painting 3 doors at the charge of 9d. per square yard the dimensions of each being 6 ft. 4 in. by 2 ft. 3 in.?   *Ans.* 7s. $1\frac{1}{2}$d.

FLOORING, PARTITIONING, ROOFING, &c.

How much will the cost be for roofing a house that measures 70 feet in depth, and 30 feet in width, at 10s. 8d. per square?   *Ans.* £22.8.0.

How many square feet in the floor, roof, and walls of a house 50 feet long, 18 ft. broad, and 15 ft. high?
$$Ans. 3840 \text{ feet.}$$

How many rods in a slated roof, the length of the ridge being 41 ft. 9 in., and the girt from eave to eave 46 ft. 6 in., allowing 9 inches additional on each side for the eaves; and what will be the content, and how much the expence of slating at 14s. 6d. the rod?
$$Ans. \text{ 6 r. 6 yd. 6 ft.—cost, } £4.9.8\tfrac{2}{5}$$

How many square yards of flooring are in a house of 4 floors, the ground one included, 60 ft. by 30 ft. within the walls, deducting from each floor the vacancy for the stairs, 12 ft. 4 in. by 8 ft. 6 in.; required the content and value thereof at 3s. 6d. the square yard?

Ans. Content, 735 yds. 3 ft. 8 in.—value £131.16.11 $\frac{1}{4}$

How many squares are there in a partition measuring 361 ft. 6 in. long, and 26 ft. 6 in. high ; and what will be the content and cost at £4.10 per square ?

Ans. 95 squares, 79 ft. 9 in. ; and cost, £431 . 1 . 9¼

How many deals 12 ft. 6 in. long, and 8½ inches broad, will floor a room 50 ft. by 16 ?   *Ans.* 90 $\frac{6}{17}$

A log of wood 12 ft. 6 in. long was sawn into 9 deals, each 1 ft. 9 in. broad ; how many superficial feet did they contain. and what is the sawyer's wages at ½d. per square foot ?

Ans. 196 ft. 10 in. 6 pt. ; and the sawyer's wages, 8s. 2¼ ¾d.

MEASURING BY THE ROD.

Bricklayers are accustomed to measure their work at the rate of a brick and a half thick, and if the thickness of the wall be more or less, it must be reduced to that thickness or standard in the following manner :—

Multiply the area of the wall by the number of half bricks the thickness the wall is of ; the product divided by 3 gives the answer.

If the area of a wall be 4085 feet, and the thickness two bricks and a half, how many rods does it contain ?

$$\frac{4085 \times 2\frac{1}{2} \times 2 = 20425}{3} - \frac{20425}{3} = 6808,3$$

Then, 6808,3 ÷ 272,25 = 25+ rods *Ans.*

Note.—272¼ = 272,25 for the divisor, decimally.

What is the expence of a wall 64 ft. long, and 20 feet high, and 3 bricks thick, at 40s. a rood ?

Ans. £11 . 17 . 0¼ $\frac{252}{}$

How many square rods are there in a wall 63½ ft. long, 14 ft. 11 in. high, and 2½ bricks in thickness ?

Ans. 5 rods 218 ft. 8 in. 2 pt.

If a wall be 1000 feet long, and 6 feet high, and 2½ bricks thick, how many rods does it contain ?

Ans. 23 r. 130 ft. 6 in. 14

Find the number of rods contained in a school room 25 ft. long, 10 ft. high, 15 ft. broad, the gable end of which measures 9 ft. 6 in. in height, 1½ brick thick; and tell what the same will come to at 3 guineas per rod?

Ans. £10.18.3½

Suppose a house measures within the walls 64 ft. in length, and 36 ft. in width, and to be of a true pitch, what will it come to roofing, at 12s. 6d. the square?

Ans. Content, 34 sq. 56 ft.; and cost, £21.12.

Admit the end of a house to be 28 ft. 10 in. in breadth, and the height of the roof from the ground, 55 ft. 8 in., the gable (or triangular parts above the side walls) to rise 42 courses of bricks, reckoning 4 courses to a foot, and that 20 feet high be 2½ bricks thick, 20 feet more 2 bricks thick, and the remaining part 15 ft. 8 in. thick, what will be the standard thickness, and the cost at £5.16 per rod?

Ans. 2283 ft. 7 in. 8 parts—cost, £48.13.5¾

· If I raise a brick wall 174 ft. 6 in. long, 6 ft. 11 in. high, and 3½ bricks thick, what must I charge for the same at £5.17 per rod? *Ans.* £60.11.4½

To find the superficial content of board or plank.

RULE.

Multiply the length by the breadth.

In a board 12 feet long, and 8½ inches thick, how many square feet?

	ft.	in.						ft.	
	12	0		Or thus, 6	(½)	12			
		8	6						
					2	(⅓)	6		
		6	0	0	½	(¼)	2		
	8	0	0				0	6	
Ans.	8	6	0	0			*Ans.* 8	6	

Required the area of a plank 14 in. broad, and 16 ft. 6 in. long? *Ans.* 19 ft. 3 in.

In a deal 10 ⅓ feet long, and 8¼ in. broad, how many
sq. feet. ?   *Ans.* 7 ft. 1 in. 3 pts.

In a deal 15 ft. 6 in. long, and 10 in. 6 pts broad, how
many square feet?   *Ans.* 13 ft. 6 in. 3 pts

Note.—If the two ends of a plank or board differ in breadth,
add the two breadths, and multiply the length by half
the sum.

How many square feet in a board 12 ft. 9 in. long, the
breadth at one end being 15 inches, and at the other, 10 ?
                                  Ans. 13 ft. 3 in. 4 pts. 6 th.

To find the solid content of square or unequal solid timber or stone.

RULE.

Multiply the length, breadth, and thickness together.

Required the solid content of a tree, 16 feet long, and
14 inches the side of the square.

ft.	in.					ft.	in.	
16	0		Or thus,. 2	(⅙)		16	0	
	1	2				2	8	
2	8	0		2	(⅙)	18	8	
16	0					3	1	4
18	8	0			*Ans.*	21	9	4
		1	2					
3	1	4	0					
18	8	0						
Ans. 21	9	4	0					

Find the solid content of a tree 14 ft. long, and 10½ in.
the side of the square.   *Ans.* 10 ft. 8 in. 7 pts. 6 th.

If a piece of timber be 18½ feet long, 14 inches broad,
and 9 deep, what is the solid content thereof?
                                  Ans. 1€ ft. 2 in. 3 pts.

What is the solid content of a piece of timber or stone, whose sides are 10 inches by 18, and the length 18 ft. ?
Ans. 22 ft. 6 in.

What is the solid content of a piece of timber 15 ft. 3 in in length, breadth 15 inches, and depth 4½ inches?
Ans. 7 ft. 1 in. 2 pts. 4 thirds 6 fourths.

Note.—The usual way to measure *round* timber is to gird the tree in the middle with a small cord, then ¼th of the girt is considered as the side of the square. *Tapering* timber is measured by girding it in two or more places, and dividing the sum of the girts by their number for the mean girt.*

What is the solid content of a round tree 25 feet long and girt in the middle 45 inches ?
Ans. 21 ft. 11 in. 8 s. 9 fths.

How much timber in a round tree 30 feet long, and the girt 42 inches ?   *Ans.* 22 ft. 11 in. 7 pts. 6 th.

How many solid feet in a round tree 28 ft. 6 in. long, and the girts 48 in., 42 in., and 36 in. ?
Ans. 21 ft. 9 in. 10 s. 1th. 6 fths.

In a piece of tapering unequal sided timber 24 ft. 9 in. long, the base of the greater end being 34 inches by 20, and at the other end 17 ft. by 10, how many solid feet ?
Ans. 62 ft. 7 in. 9 pts. 4 th 6 fths.

Note.—Add the length and breath of the bases separately ; divide each of the sums by 2 ; then multiply the quotients together, and that product by the length.

How many square feet in the floor, roof, and walls of a house 50 feet long, 18 feet broad, and 15 feet high ?
Ans. 3840 feet.

What is the weight of a plank 24½ feet long, 2 broad, and 1¼ thick, at 25 lb. the solid foot ?   *Ans.* 1531¼ lb.

Required the price of the same, viz. 61¼ feet, at 14d. per foot, and the expence of carrying it at ½d. per lb.
Ans. Price, £3.11.5½—carriage, £3.3.9$\frac{11}{22}$

* All parts of a tree that are less than two feet in circumference are not considered timber.

PLANK MEASURE.

*To find how many loads and feet of timber are in any
quantity of timber.*

RULE.

If the thickness of the plank be	the square feet divided by	will be loads; and by	solid feet *
4 inches.	150		3
3	200		4
2½	240		4,8
2	300		6
1½	400		8
1	600		12
¾	800		16

How many loads and feet of timber are 7684 feet of 4
inch plank?

```
150 ) 7684 ( 51 loads 11⅓ ft, Ans.
      750
      ———
      184
      150
      ———
   3 ) 34
      ———
      11⅓ ft.
```

In 7420 feet of 3 inch plank how many loads and feet of
timber?   *Ans.* 37 ld. 5 ft.

In 4150 feet of 2½ inch plank, how many loads, &c.?
                                           Ans. 17 ld. 14 ft.

How many feet long of plank 2½ inches, and 14 inches
wide will make a load?

$$2,5 \times 14 = 420$$

$$50 \times 12 \times 12 \times 12 = 86400 \div 420 = 205, 71 \text{ pts. } Ans.$$

* As 50 solid feet of square or hewn timber make a load, it is evi-
dent that the plank of 4 inches being only ⅓ part of a foot in thick-
ness, the superficial content must be 3 times 50, or 150 feet, to be
equal to a load; and so of the rest. And, for the same reason, the
square feet of the 4 inch plank divided by 3, the 3 inch by 4, &c.,
will give solid feet.

How many feet of 3½ inch plank, 15 inches wide, will make a load? *Ans.* 137 ft. 142 pts.

In 3180 feet of 1½ inch plank how many loads and feet of timber? *Ans.* 7 lds. 47½ ft.

MENTAL CALCULATIONS.

What are 4 times 2 and the half of 12?

What is the square of 2 added to half a hundred?

What is the cube of 3, added to 5 score;

If I add ¾ to 8 halfpence, how much is it?

Tell me the one-tenth part of a thousand?

What are 7 halfpence and 8 farthings.

What is the fourth part of a pound, of a crown, of a shilling, of a sixpence, of a groat?

If 2 birds cost 4¾d., and 2 tops 2½d. each, what was the whole cost?

What are 18½ yards of calico worth at 2s. a yard?

Add 1¾d. to 4½d. and three sixpences together.

What is one fourth and three fourths of a sovereign?

What is the amount in shillings of 4 pounds, 3 crowns, and 10 sixpences?

What will 100 yards of tape cost at ¾d. a yard?

How many farthings are equal to one shilling and six-pence?

Add ¾d. to a halfpenny, and 9 farthings more; what is that?

How many lbs. of meat are there in 12½ stone?

What are 9 times 9 and the half of 9?

What is the ¾th, the ⅓th, the 1⁄10th, and the ⅕th of a pound ?

How many twopences are there in one crown and ten sixpences ?

What will 4½ dozen of wine come to at 3s. a bottle ?

How many halfpence are there in 2 sixpences, 2 twopences, 8 groats, and 20 pence ?

Tell me what 23½ yards of cloth would cost at 2s. 6d. a yard ?

What is half a lb. of butter at 56s. a firkin ?

If 14 yards of shoe-string cost 20d., how much will twice the measure come to, deducting 3½d. spent in cakes and fruit ?

What is the price of a bottle of wine, when a dozen cost 2 guineas and a crown ?

Add up in your memory twice 20 and four times 65.

How much will 200 apples cost at ¼d. each ?

How many halfpence are there in a guinea, and how many pence and farthings in £1 ?

If 2 kites cost 4d., what will a dozen cost ?

Pay a man for 84 days' work at 3s. 6d. a day.

What are 24 farthings and as many three farthings ?

What will 90½ pieces of broadcloth come to, at 5 guineas per piece ?

How many half gallons are there in 3 hogsheads of beer ?

What will 19 pears cost at 1¾d. each ?

How many dozen bottles will a tun of wine fill ?

How many dozen buttons make two gross ?

How many quires of paper are there in 10 reams ?

How many sheets of paper are there in 20 quires, each 24 sheets ?

How many trusses are there in 20 tons of straw, each 1 load and a half, and 36 trusses to each load ?

How many times will a hoop, which is a yard in circumference, turn in two miles ?

If I buy a book for 3s. 6d., and sell it for 3 half-crowns, what do I gain ?

If I spend 1s. 10½d. out of 4 crowns, what have I left ?

What is the weekly expenditure of bread at 1s. 5d. a day ?

How much will be due to a servant for a month's wages, at £10 a year ?

What is fourteen times eighty ?

Bought a knife for 1s. 9d., a quire of paper for 6d., a slate for 4½d., and spent in oranges and nuts 7½d. ; what is it altogether ?

What is the value of 1 hundred weight of soap at 6¼d. per lb. ?

What will the consumption of a pint and a half of ale daily (at 6d. a pot) cost in one year, reckoning 365 days ?

Add together ½ of 10s. to ⅔ of a pound.

If 1 cwt. cost half a crown, what will 240 cwt. cost ?*

EXAMPLES IN EQUATION OF PAYMENTS, BARTER, PROFIT AND LOSS, PARTNERSHIP OR FELLOWSHIP (SINGLE AND DOUBLE), AND EXCHANGE.†

EQUATION OF PAYMENTS.

A owes B £200, of which £40 is due at 3 months, £60 at 5 months, and £100 at 10 months; at what time may the whole be paid at once ?

* Here 2s. 6d. is the ⅛ of a £ : so that, 240 ÷ 8 = £30 for the answer. And the same can be done with any other *fractional* part.

† These rules, with the exception of Exchange, are little known, and seldom used, in mercantile transactions.

Barter.

$$
\begin{array}{rcl}
\pounds & \text{mo.} & \pounds \\
40 \times & 3 = & 120 \\
60 \times & 5 = & 300 \\
100 \times & 10 = & 1000 \\
\hline
200 & &)\ 1420\ (\ 7\frac{1}{10}\ \text{mo. } \textit{Ans.} \\
& & 1400 \\
\hline
& & \frac{20}{200} = \frac{1}{10}
\end{array}
$$

Bought a quantity of goods to the value of £360, which it was agreed should be paid in the following manner: viz., £120 at 2 months, £200 at 4 months, and the rest of the money at 5 months; required the time of payment.

Ans. 3 mo. 13 da.

BARTER.

How much tea at 9s. a lb. can I have in barter for 4 cwt. 2 qr. of chocolate at 4s. per lb. ?

$$
\begin{array}{r}
\text{cwt. qr.} \\
4 \quad 2 \\
4 \\
\hline
18 \\
28 \\
\hline
144 \\
36 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
4 = \frac{1}{2}\ )\ 504\ \text{lb. at 4s.} \\
\hline
\end{array}
$$

$$
\begin{array}{rcccc}
\text{s.} & & \text{lb.} & & \\
\text{As } 9 & : & 1 & :: & 100 \quad 16 \\
& & & & 20 \\
\hline
& & & 9\ )\ 2016 \\
\hline
& & & 112\ )\ 224 \\
\hline
& & & \textit{Ans.}\ 2\ \text{cwt.}
\end{array}
$$

G has 5 pipes of wine at £30.17 per pipe, which he barters with H for flannel at 20½d. a yard; what quantity of flannel must G receive?   *Ans.* 1805 $\frac{15}{41}$ yds.

D has 105 gallons of brandy at 15s. 10d. per gallon, for which he received of E £32.16, and 450 pounds of sugar; what was the sugar per lb.?   *Ans.* 2s. 2¾d.$\frac{22}{11}$

How many dozen of candles, at 5s. 2d. per dozen, must be delivered in barter for 3 cwt. 2 qr. 16 lb. of tallow at 37s. 4d. per cwt.?   *Ans.* 26 doz. 3 lb.

PROFIT AND LOSS.

If cloth be bought at 7s. 6d. a yard, and, being damaged, sold at 6s. 2¼d. a yard, what is the loss per cent.?

```
                      s.   d.
                      7    6  bought for
                      6    2¼ sold for
     s.   d.          ─────────                      £
As   7    6    :  1   3¾ loss per yard   : :         100
     2               12                               20
   ─────            ─────                           ──────
    15               15                              2000
   ─────              4                                 2
     .              ─────                           ──────
                     63                               4000
                    4000                            ──────
```

```
          ⌠ 5 ) 252000
          │    ─────────
     15 ⎨    3 ) 50400
          │    ─────────
          ⌡  4 ) 16800
               ─────────
              12 ) 4200
               ─────────
              2,0 ) 35,0
               ─────────
```

Ans. £17   10 loss per cent.

N.B.   Here 7s. 6d. is in proportion to 1s. 3¾d. its loss, as £100 is to its proportionate loss.

Bought 12 cwt. 2 qr. 13 lb. of sugar for £44.3.1½; at what rate must it be sold per lb. to gain £25 per cent. ?
Ans. 9¼d.

Bought a hogshead of wine for £50.8, and sold it for £63; what did I gain per cent. ?   *Ans.* £25.

If I gained £25 per cent. by wine which I bought at £50.8 per hhd., what did I sell it at ?   *Ans.* £63 per hhd.

Bought sugar at 8½d. per lb. ; at what rate must I sell it per lb. to gain £17 1¼ per cent. by it?   *Ans.* 10d.

If cheese be bought at £3.14.8 per cwt., and sold at 10½d. per lb., what is gained per lb. ?   *Ans.* 2½d.

Sold 238 yards of muslin at 4s. 7d. per yard, by which I gained £30 per cent; what did I gain in the whole ?
Ans. £16.17.3.

If I buy tobacco at 10 guineas per cwt., at what rate must I retail it per lb. to gain £12 ?   *Ans.* 2s. 1⁴⁄₅d.

FELLOWSHIP (SINGLE).

Divide £140 between three persons, so that their shares shall be to each other as 1, 2, and 3.

								£	s.	d.	
1	As 6	:	140	: :	1	=		23	6	8	
2	6	:	140	: :	2	=		46	13	4	*Answers.*
3	6	:	140	: :	3	=		70	0	0	
6								140	0	0	*Proof.*

Two merchants traded together, A put in £20, and B £40 ; they gained £50 ; what was each person's share?
Ans. A's gain, £16.13.4 ; B's £33.6.8.

A bankrupt is indebted to B £250, to C £280, to D £300, and to E £102.10; his estate is worth only £600; how must it be divided amongst his creditors?

Ans., £160.17.1¾ 105; C, £180.3.2½ 790;
D, £193.0580; and D, £65.19.0¼ 1285.

A, B, and C join stocks in trade; their stocks amount to £200. A's gain was £3, B's £5, and C's £8; what was each man's stock?

Ans. A's, £37.10; B's, £62.10; C's £100.

FELLOWSHIP (DOUBLE).

D and E entered into partnership; D put in £40 for 3 months, E £75 for 4 months, and they gained £70; what was each man's share of the gain?

40 × 3 = 120   As 420 : 70 :: 120 = 20 D's share.
75 × 4 = 300   420 : 70 :: 300 = 50 E's share.
          ———   ———
          £420   £70 *Proof.*

Four graziers took a piece of pasture land for a year, for which they were to pay 35 guineas. F put in 27 oxen for 11 months; G, 18 oxen for 7 months; H, 12 oxen for 9 months; and I, 33 oxen for 4 months: required what each man must contribute towards the rent.

Ans. F, £16.19.3 108; G, £6.19.8 578; H, £5.19 8½ 642; and I, £7.6.4 48.

EXCHANGE. *

Exchange teaches us to find how much of the money of one country is of equal value to any given sum of the money of another.

* The author is indebted to "Tate's Arithmetic" for the sums in this rule, to which the pupil will refer for more complex examples, if such be deemed necessary.

HOLLAND.

If £1 of English money produce 35s. 8f. in Holland, what will £300 produce ?

```
                  s.   f.        £.
     If 1    :   35    8   : :   300
                       3
                 ───────
                 107   0
                       100
                 ───────
                 10700
                     3
                 ───────
         10 ) 32100 shilling.
                 ───────
         Ans. 3210
                 ───────
```

Shillings are reduced into florins by multiplying by 3 and deducting by 10; a shilling being 12 grotes, is therefore 12-40ths or 3 tenths of a florin.

The Table abridged.

```
     2 grotes.......... 1 stiver
    12   do. or 6 stivers . 1 shilling.
    20 stivers.......... 1 florin or guilder.
    32 grotes .......... 1 mark.
```

If 36s. 6 gr. produce £1, what will 6000 gr. produce ?
                    Ans. £547.18.11 sterling.

If 35s. 4 gr. be worth £1, what will 3117 gr. 11s. 4 p. be worth ?   *Ans.* £294.2.2.

ROTTERDAM.

How many current florins will £800 sterling produce at 11 flor. 12 stiv. per £ ?

```
             flo. stiv.
             11  12
                 10
             ───────
             116   0
                   80
             ───────
     Ans. 9280   0 currt. flo.
             ───────
```

If 10 fl. 16 st. produce £1 sterling, what will 5380 florins produce ?   *Ans.* £498.3.

HAMBRO'.

If £1 produce 35s. 3gr., what will £500 pound produce ?

```
           s.   g.
          35   3
          12
          ____
          423 grotes.
              500
          ____
    2 ) 211500 grotes.
          ____
   16 ) 105750
          ____
   Marks 6609   6
          ____
```

If 36s. 2gr. produce £1, what will 1000 marks produce?
                                    Ans. 737.6.7 sterling.

If 35s. produce £1, what will 26797 marks produce ?
                                    Ans. £2041.14.8.

FRANCE.

If £1 produce 24 liv. 7s., what will £571 produce

```
              571
               24
             ____
   4   (¼)   13704
   1   (⅛)     142 15
               28 11
             ____
        Liv. 3875   6 Ans.
             ____
```

Table.

A sous (pr. soo·)... ½ value.
20 sols.......... 1 livre.
 3 liv. or 60 sols .. 1 ecu or crown.
24 livres .... 1 Louis-d'or (20s.).
100 cents .... 1 franc (10½d.).

If 81 livres produce 80 francs,* what will 16678 liv. 8s. 3d. produce? *Ans.* 16472 fr. 51 cts.

If 24 liv. 11 sols. produce £1, what will 1000 livres produce? *Ans.* £40.14.8 sterling.

If £1 produce 24½ francs, what will £1000 produce? *Ans.* 24500 francs.

SPAIN.

If 39¼d. produce 8 reals of plate, what will £500 produce?

```
        d.      r. of p.      £
    If 39¼  :    8   : :    500
         4                  960
       ───                ──────
       157                480000
       ───                     8
                          ──────
                    157 ) 3840000
                          ───────
```

Silver r. of plate 24558   20 marav.

Table.

34 maravedies......1 real vellon.

8 reals..........{ 1 piastre, or
                 { 1 dollar.

If 39½d. produce 15 r.v. 2 mar., what will £100 produce? *Ans.* 9149 copper or vellon 22 mar.

If 8 reals are worth 37¾d., what are 76782 reals worth? *Ans.* £1509.12.11.

If 15 r.v. 2 m. be worth 38¼d., what will 20000 reals vellon be worth? *Ans.* £212.7.3.

PORTUGAL.

If 63d. produce 1 milrea, what will £1000 sterling produce?

```
          1000
           240
         ──────
    63 ) 240000
         ──────
```

Ans. 3809 milreas 524 reis.

---

* 80 francs make 81 livres, and 24¼ livres £1 sterling.

Table.

1000 reis...... 1 milrea.

If I remit to London 8000 milreas 500 reis, exchange at 5s. 2¼d. per milrea, what does it come to in sterling money?

		mil.	reis.				mil. reis.
	(¼)	8000	500			Or done thus,	8000,500
2	(₁₀)	2000	125				62¼
		66	671			12)	498031,125
1	(⅛)	8	334			2,0)	4150,2—7

Ans. £2075 130 = 2s. 7d.

Ans. £2075 2 7

GIBRALTAR.

Exchange 2172 c. dollars 3 r. 12 g., at 36¾ each, into pounds sterling.

		c. d.	r.	q.				r.			36¾
26	(⅛)	2172	3	2	at	2	(¼)				
6	(¼)	271	10			1	(½)			9,75	
¾	(⅛)	54	6			g 8	(½)			4½,37	
		6	15	9		4	(⅓)			2¼,18	
		1	5	= val. of 3 r. 12 q.						1,59	

Ans. 332 13 2

15s. 82

If 38d. be worth 1 dollar, what will £670 be worth?
Ans. 4231 dollars 4s. 10d.

If 8 reals be worth 37½d., what will 1301 hard dol. 2¼r. be worth?
Ans. £304.19.4 sterling.

ITALY.

What number of dollars at Leghorn will £80 produce at 5¼d. per dollar?

```
          d.      dol.        £
    If 51¼  :   1   : :   80
         4                 960 = £1
    ─────              ─────────
    205               ) 76800
    ─────
                  Ans. dol. 374  12   1
                           ─────────────
```

Table.

```
    42 deniers........ 1 sol.
    20 sols .......... 1 livre.
     6 solidi......... 1 gross.
    26 gros.......... 1 ducat.
```

Value 6000 dol. 10 s. at 48¼d. each.

```
                        dol.   s.
    2   6   (⅛)      6000  10

    1   3   (½)       750   1   3
        3   (¼)       375   0   7½
        ¼   (1/12)     75   0   1½
                        6   5   0
                      ──────────────
              Ans. 1206   7   0 sterling.
                   ──────────────
```

If 42½d. produce at Naples 1 ducat, what will £580 produce?   *Ans.* 5275 ducats, and 219 over.

If 58½ liv. produce £1, what will 3712 liv. 11 sol. 6 de. produce?   *Ans.* £73.10.4.

GERMANY.

If 14 g. 5 c. produce at Vienna £1, what will 3874 gro. 13 c. produce?

```
        g. c.      £        g.    c.
    If 13   5   :  1   : :  3874  13
        60                   60
    ─────              ──────────────
    785              785 ) 232458 cr.
    ─────                ──────────────
                  Ans. £296   2   6 sterling.
                       ──────────────
```

Table

           4 fenings...... 1 cruitzer.
          60 cruitzers..... 1 florin or guilder.
          90   do.   ..... 1 rix dollar.

If 12 gr. 30 c. produce £1, what will 4000 grs. produce ?
                                            Ans. £320 sterling.

If 188 florins produce 201 marks, what will 6542 flor.
35 c. produce ?

               mks. grts.
               6960   6
      Charges   69 19 one per cent.
               ─────────
Ans. 6890 19 marks, Net proceeds at Hambro'.

PETERSBURGH.

If 100 copecs produce 30⅝d., what will 3267960 copecs
produce ?
               3267960
                  30⅞
            ─────────
Ans. 1008982,65 pence, or £4204 . 1 . 11

Table.

          100 copecs...... 1 ruble.

SWEDEN AND DENMARK.

If 41 c. d. 17 r. produce at Stockholm £1, what will
6 c. 171 d. 7 r. produce ?   *Ans.* £148.11.10

If 6 r̈. d. 42 sk. produce at Copenhagen £1, what will
1171 r. d. 15 sk. produce ?   *Ans.* £181.18.7 sterling.

IRELAND.

What Irish money must I receive in Ireland for a remit-
tance of £800 sterling, exchange being at 10½ per cent. ?

               £   d.
        1/₁₀ 800   at 10½ per cent.
        1/₂₀   80
               4
            ─────────
Ans. £884 Irish money.

F

A gentleman at Dublin remits to London £630 Irish, exchange at 10¾d. per cent.; what sterling money will be received ?   *Ans.* £541.15.3.

AMERICA.

If 107½ dollars will buy a bill of 100 dollars, what will 8000 dollars buy ?   *Ans.* 7459 dol. 21 c.

Note.—100 cents = 1 dollar.

If 40 dol. produce £9, what will 7459 dol. produce ?
                    Ans. £1678.6.5.

INVOICES.*

An Invoice is a specification of goods, showing at one view their actual cost, with the charges thereon, and total amount thereof.

Invoice of twenty-two packages of printed calico, marked, &c.

		£	s.	d.	£	s.	d.
C.H. M.	Twenty-two packages, each containing 100 pieces of 60 yards each, in all 132000 yards, at 4½d. per yard.	2475	0	0			
	Discount 19 per cent.	247	10	0			
					2227	10	0
	CHARGES.						
	Packing and other charges.	15	18	0			
	Insurance and policy.	30	0	0			
	Brokerage.	5	11	4			
					51	9	4
					£2278	19	4

* The forms of business require that every invoice should be dated and signed at the foot by the parties making it. The letters E and O E are also frequently made use of to represent the words "Errors," and "Omissions excepted," as a sort of salvo against advantage being taken of any mistakes in the account·

Invoice of refined sugar.

	cwt.	qr.	lb.		£	s.	d.	£	s.	d.
No 1 to 6	58	3	9 gross.							
	6	1	8 tare.							
	52	2	1 net at 80s.	210	0	9				
			6 hhds., &c.	2	8	0				
								212	8	9
No. 7 to 12	52	2	16 gross.							
	5	3	22 tare.							
	46	3	22 net at 80s.	186	15	9				
			6 hhds., &c.	2	8	0				
								189	3	9

Amount of goods 401 12 6

Commission on £401.12.6 at 2½ per cent. 10 0 10

411 13 4

Insurance on £500* at 16 guineas per cwt. and policy 25s. ⎱ 85 5 0

Commission† on £500 2 10 0

87 15 0

Amt. of the invoice £499 8 4

6 BAGS OF DEMERARA COTTON.

cwt. qr. lb.　　　　lb.

Gross 16　1　15　= 1825

45½ tare (1-40th).

1779½ net at 21½d.　= £159.8.3.

* The Insurance is made on £500 to include the £411.13.4, and the cost of the insurance.

† You charge Commission as a remuneration for your trouble in executing the order of your correspondent.

AN EXAMPLE,

To illustrate the difference, or to show the *balance*, between debtor and creditor.

Mr. THOMAS CARLING in account with WILLIAM HENRY JOLLY.

1841.		DEBTOR.	£	s.	d.	1841.		CREDITOR.	£.	s.	d.
Jan.	3	To sundries	4	16	6	Jan.	19	By bill at sight	18	0	0
	15	To 25 yards of cloth	2	16	4		24	By brandy at 30s.	15	16	6
Feb.	3	To bill returned	18	0	0	Mar.	4	By sundries	45	9	0
Mar.	16	To cash lent..........	35	5	0	Ap.	27	By cash	50	10	0
Ap.	4	To 10 gal. of rum at 15s .	7	10	0			By balance	6	12	8
	10	To teas...............	37	19	6						
	19	To muslin	5	9	0						
May	2	To sundries	24	11	10						
			£136	8	2				£136	8	2

Account Sales of a bale of Italian thrown silk, marked and numbered as in the margin, received by the Mary, from Calais, and sold by order, and for the account of Marietti and Co., of Milan, at 6 months' credit.

		£	s.	d.	£	s.	d.
D & D 22	One bale of thrown silk, weight 248 lb. 8 tare.						
	240				360	0	0
	CHARGES.						
	Freight	1	2	0			
	Duty 240 lb. at 5s. and Entry, 6s. 6d.	60	6	6			
	Scavage ½ lb.		10	0			
	Landing, charges, ware-house rent, small charges, and Fire Insurance	2	0	0			
		63	18	6			
	Marine Insurance and policy £400, at 7s.6d. per cwt.	1	10	0			
		65	8	6			
	Interest 7 months, at 5 per cent.	1	17	11			
	Brokerage on £360, at ⅝th per cent.	2	5	0			
	Commission	7	4	0			
	Del Credere do. do...	7	4	0			
					83	19	5

Net proceeds—Value, 22 Feb., 1841 £276 0 7

London, 1st January, 1841.

Invoice of 100 Bales of Cotton, shipped on board the
Eliza, Dempster, for Cadiz, by order and on account of
Messrs. Lopez and Co., of Lisbon.

100 BALES OF COTTON.

L. & Co.		cwt.	qrs.	lb.	£	s.	d.
1 at 100	Weight gross........	360	0	0			
	draft, 2 lbs...	3	2	8			
		356	1	20			
	Ropes	2	0	6			
		354	1	14			
	Tare	19	3	4			
	Net	334	2	10			
	Or, 37,474 at 8d.				1249	2	8

	CHARGES.	£	s.	d.			
	Bond, Dock, and Town						
	dues and entry	4	1	0			
	Cartage and Porterage.	4	8	0			
	Bills of Lading and						
	petty charges	0	6	8			
	Brokerage ¼ per Cent.	6	5	0		15	2	6
					1264	5	2
	Commission 2 per cent.				25	5	0
					£1289	10	2

Liverpool, 18th January, 1841.

　　　　　　　　Millard & Co.

BOOK DEBTS, AND BILLS OF PARCELS.*

Old Change, Feb. 27th, 1841.

Mr. J. Scott

Bought of W. Richards.

	£	s.	d.
1 James on the Collects		5	0
2 Carpenter on the Psalms.		4	0
2 do. on the Church Prayers		5	0
2 do. Christian's Manual		4	0
6 do. Scholar's Spelling Assistant . . .		9	0
2 Testaments		3	6
1 Large Bible, half-bound		9	0
6 Common Prayers.		12	0
2 Quires of post paper		1	10
2 do. large foolscap		3	4
Binding Gibbon's Rome in calf, elegant. . . .	1	10	6
Sundry Magazines, Pamphlets, &c.		8	10½

£

Mrs. Canning, dr.

To Elizabeth Wheeler.

1841.		£	s.	d.
Jan. 1	1 lb. butter		1	1
2	2 lb. cheese		1	8½
5	6 eggs		0	9
21	1 Dutch cheese.		1	9¼
Feb. 6	2 lb. bacon.		1	3
8	Sand and Salt		0	3½
10	Vinegar, pepper, &c.		1	9
Mar.3	Butter		1	0
7	2 oz. tea		0	9

* After having worked these bills, the tutor will keep a *private* memorandum of the amount of each, so that the pupil may be left to exercise his own skill and industry, and not be led by idleness or deception to copy off what he has to do.

Henry Bigley, Esq. dr.

To Thomas James Rayner.

			d.	£	s.	d.
1841.						
Jan. 2	Beef and mutton..	14½ lb. at	9			
4	do.........	12¼	8			
' 12	Beef steaks	3	10¼			
17	Veal...........	10¾	9½			
Feb. 6	Beef and mutton..	15¼	8			
17	Pork	9	8½			

£ _____

London, 4th Jan. 1841.

Mr. Leeds

Bought of John Gray.

		s.	d.	£	s.	d.
Irish cloth	16 yds. at	3	6 per yard.			
Cambric muslin...	24	3	8			
Broad cloth......	42	13	6			
Drugget	18	3	4			
Brown Holland...	15	1	6			
Diaper..........	56	2	7½			

£ _____

Mile-end, 24th Jan. 1841.

Mr. Jarvis

Bought of Richard Carter.

		s.	d.	£	s.	d.
Cotton hose	13 pairs at	2	6			
Worsted do.	26	1	3½			
White silk do..........	12	5	6			
Black do.	12	6	6			
Gentlemen's half hose...	17	1	10½			
Kid gloves............	7	1	6			

£ _____

Mr. H. C. Carpenter

Whitechapel, February 4, 1841.

Bought of James Wood.

	lb.		d.	£	s.	d.
Veal cutlets. . . .	4¾	at	11½			
Leg of lamb . . .	6½		11½			
Leg of mutton . . .	9¼		9			
Ribs of beef . . .	17¾		10½			
Pork chops	2½		9½			
Half a calf's head				0	2	6

£

Mr. Wise

Bow, Feb. 19, 1841.

Bought of George Temple.

	lb.		s.	d.	£	s.	d.
Hyson tea	7	at	7	9			
Bohea ditto . . .	14		5	2			
Coffee	12¼		2	6			
Ditto	2¼		2	0			
Lump sugar . . .	22½		0	10½			
Moist do.	14		0	7			

£

Mr. Charles Chester

Cheapside, 4th March, 1841.

Bought of Thomas Hyder.

		s.	d.		£	s.	d.
Port wine . .	26¼ doz. at	38	6	per doz.			
Madeira . . .	15	42	6				
Sherry . . .	19½	36	0				
Brandy . . .	6 gal.	28	6	per gal.			
Rum	3½	16	6				
Gin	10	11	0				

Discount 2½ per cent.

£

F 5

Fleet-street, March 17, 1840.

James Laird, Esq.

Bought of Samuel Finch.

	oz.	dwt.	qr.	s.	d.	£	s.	d.
A silver waiter	20	2	0	at 5	10 per oz.			
A do. teapot and stand	11	3	10	6	6			
A do. tankard	31	4	12	7	4			
½ doz. silver forks....	12	2	4	6	1½			
1½ doz. silv. table spoons	40	2	8	5	10			

Cr. by cash in part　10　10　0

Bal. £

Chelmsford, April 4th, 1841.

Mr. William Pratt

Bought of John Hurley.

		s.	d.	£	s.	d.
Barley	121 qrs. at 34	6 per qr.				
Wheat	65	60	6			
Oats.............	73	24	0			
Rye	116	30	6			
White Peas	421 bu.	38	0 per bu.			
Beans	43½	6	4			

£

Greenwich, 3rd May, 1841.

Mr. Brett

Bought of Richard Pell.

	cwt.	qr.	lb	lb.	s.	d.	£	s.	d.
Soap	11	3	7	tare 14 at 50	6				
Sugar........	65	2	17	16	48	0			
Rice	51	0	14	8	30	6			
Cartage, Wharfage, &c.							2	10	6

£

Mancnester, 16th Aug. .840.

Mr. B. Millard

Bought of Joseph Wm. Longly.

	s.	d.	£	s.	d.
19¾ yds. of Irish linen.....at 2	4	per yd.			
24½ pieces of do. 46	6	per p.			
16½ doz. pr. of hose....... 1	8	per pr.			
13½ score of men's night caps	10½	each			
36⅝ pieces of cambric...... 48	0	per p.			

£ _____

London, Sept. 3, 1840.

Messrs. Willett and Co.

Bought of Simon Vane.

4 hhds. of sugar, viz.:

	cwt.	qr.	lb.	
No. 1	16	1	4	Tare, 18 lb. per cwt.
2	18	3	16	Draft, 2 cwt.
3	15	0	0	
4	15	3	10	

£ s. d.

Net, 53 cwt. 1 qr. 18 lb. at 36s. 6d.

2 hhds. of Delti,

	cwt.	qr.	lb.
No. 1	15	3	21
	16	0	14

Tare, 1200 lb. in the whole.
Draft, 300 lb.
Net, 2091 lb. at 34s. 8d. ....

£ _____

Brentwood, 5th Sept. 1840.

Mrs. Corder

Bought of Edward Forrest.

			s.	d.	£	s.	d.
Muslin	12½ yds.	at	2	7½			
Cambric	6½		1	9			
Silk	14¾		2	6½			
Brocade	4¼		3	2½			
Print	6⅝		1	6			

£

12th Sept. 1840.
Received of Mrs. Corder,   pounds,   s.   d., as per
bill.   EDWARD FORREST.
    £

Southwark, Oct. 9th, 1840.

Messrs. Dale and Co.

Bought of Frederick Paas.

	s.	d.	£	s.	d.
1164⅝ pieces of cloth .. at 56	6 per piece				
146½ do. each 24 yds... 2	4 per yd.				
3000⅜ do. 29	3 per p.				

Discount at 2½ per cent.......

£

Newgate-street, 15th March, 1841.

Mrs. Whitwell

Bought of Edward Price.

	s.	d.	£	s.	d.
Calico—120 pieces, each 47½ yds. at		8½			
Bombazine........... 52	3	6			
Book Muslin 8	1	4			
Sheeting 56½	1	10¼			
Flannel 20	1	6			
Lawn 10	2	9			

£

Woolwich, Oct. 4, 1840.

Mr. James Keeling

Bought of J. and E. Ward.

	s.	d.	£	s.	d.
14½ stone of meat......... at	7 per lb.				
12¾ do...............		6½			
8¼ do...............		10½			
120 lb. mutton.............	4	6 per stone			
176½ lb. lamb and beef	5	8			

Discount allowed for immediate payment......

£

RECEIPTS, PROMISSORY NOTES, &c.

Received, January 2nd, 1840, of Mr. Thomas Crane, ten pounds five shillings, as per bill delivered.

£10.5.   WILLIAM JORDAN.

Received, Jan. 4th, 1840, of Mr. James Freeman, five pounds for a quarter's rent due Christmas last.

£5.   MARY WILSON.

Received, Jan. 21st, 1840, of Mrs. Wool, thirteen pounds, nine shillings, and sixpence, for haberdashery, &c., as per bill,   JOHN EVANS.

£13.9.6.

Recd., Feb. 10th, 1840, of Samuel Meek, Esq. fifty pounds on account.   EDMUND BURKE.

£50.

Received, 7th May, 1840, of Mr. Lowndes, ten pounds for my quarter's salary, due this day.

£10.   JOHN MELLISH.

Received, April 5th, 1840, of Mr. George Truman, eight pounds, for a year's wages, due at Lady day last.

£8,   MARY CURTIS.

Recd., May 16, 1841, of Mr. William Williams, forty guineas for a bay mare, warranted sound in wind and limb, and not given to any vice whatever,
     £42.   CHARLES LODGE.

Recd., 12th May, 1841, of Mr. Noble, jun. nineteen pounds, 3s. 11½d. in part of a bill delivered to the 3rd inst.
     £19.3.11½   JAMES GROAT.

Recd., 20th May, 1841, of Charles Phillips, Esq. one hundred and ten pounds, eight shillings and tenpence, for self and partner, as per account herewith,
     £110.8.10.   FREDERICK MASON.

Recd., 8th Jan., 1841, of Mr. Thomas Corton, eleven pounds, 4s. 6d., for bricklayer's work done, as per bill,
     £11.4.6.   JAMES ROGERS.

FORM OF AN ENGLISH BILL.*

£140.10.6.   London, the 2nd February, 1841.

Two months after date pay to me, or my order, one hundred and forty pounds, ten shillings, and sixpence, for value received,
              WILLIAM CASHMAN.

To Messrs. Boyd and Co.
     Gravesend.

FORM OF A PROMISSORY NOTE.

              Gravesend, the 2nd Feb., 1841.

£140.10.6.

Two months after date we promise to pay to Mr. William Cashman, or order, one hundred and forty pounds, ten shillings, and sixpence, for value received,
             WILSON & Co.

Payable at Coutts' & Co.
     London.

* The difference between a *bill* and a *promissory note* is this,—a bill requires the acceptation of the drawer (which is given by writing his name on it, called *endorsing*) before it becomes of any value ; a promissory note, on the contrary, is binding the moment it is made and delivered, no acceptation, from the very form of the security, being at all necessary.

A TRADESMAN'S ORDER FOR GOODS TO BE SENT

Norwich 18th March, 1841.

Sir,

I will thank you to forward, per first waggon, the following articles :—

	cwt.	qr.	lb.		
Loaf sugar	2	0	0	at	90s.
Moist do.	1	2	0		64s.
Green tea	0	0	14		7s. 6d.
Black do.	0	0	7		5s. 4d.
Rice	1	0	0		7s.

Your attention will much oblige, Sir,

Your's obediently,

JAMES PRICE.

THE ANSWER.

London, 23rd March. 1841.

Sir,

I have forwarded, per Deacon's waggon, the whole of your order, with the exception of the rice, owing to my not having any which I can at present recommend ; and am, Sir,

Your obliged

and obedient servant,

JOHN TRUMAN.

ARITHMETICAL QUESTIONS,

FOR WEEKLY OR OCCASIONAL EXAMINATION.*

$3\frac{1}{2}$ butts of beer, at 2d. a pint.

$3\frac{1}{2}$ hhds. of ale, at 4d. a pint.

119 day's wages, at 2 guineas a week.

If I spend $4\frac{1}{2}$d. a day, what will that be in 100 weeks' time ?

* The Author has adopted this plan successfully, varying it now and then with a bill of parcels, or an invoice, &c.

Multiply £41.10.6 by 4⅞.

Divide £100 and 3 crowns by 12⅘.

———

2 pints of ale cost me 8d., what should I pay for 3 gal. 2 qts. 1 pint ?

8 bottles of port wine cost me 32s. 6d., what am I to pay for 18½ dozen ?

I have 13s. 6d. a week from my employer, what is that a year ?

12 cwt. 3 qr. 10 lb. of cheese, at 7½d. per lb,

18¼ tubs of butter, each weighing 37¾ lb., at 7¾d. per lb.

———

Gross weight 16 cwt. 17 lb., tare 18 lb. per cwt., draft 110 lb., how many gallons of oil, and value at 26s. 6d. per gal. ?

What are 19 bar. 2 firk. 3 gal. of beer worth, at 16d. a gal.

Divide 119 tons 13 cwt. 2 qr. 11 lb. 2 oz. by 23.

If I have a yearly income of £100, what may I allow myself to spend every day ?

Divide £100 by 10⅘.

———

19½ doz. of port, at 2s. 3d. a bottle.

100 bottles of Madeira, at 64s. per doz.

15 quarts of rum, at 14s. 6d. a gal.

16 quarts of brandy at 30s. a gal.

118 pints of ale at 8d. a quart.

———

1000 barrels of beer, at 86s. 6d. per hhd.

10,000 sacks of flour, at 4s. 2d. a bushel.

119 days' service, at 50 guineas per annum.

What is the 7½ of a million of guineas ?

Multiply 1000 crowns, and as many groats, by 13⅜.

1008 gallons of wine at £130 per pipe.

1500 bottles of madeira, at 84s. per doz.

1162 trusses of hay, at 58s. per load.

Multiply 25½ guineas and a 6d. by 23.

Divide 19,426 tons 12 cwt. 2 qr. 10 lb. 13 oz. by 362.

Multiply 21 cwt. 3 qr. 15 lb. 2 oz. by 4⅜.

Divide 20,000 half-guineas by 31.

Pay a man his wages, viz., 15 weeks 2 days, at 2s. 6d. a day.

What are 4½ hdds. of wine worth, if I gave 2s. 3d. for a bottle which contained 1½ pint ?

What are one thousand bottles of wine worth at 50s. a dozen ?

What must I pay a man for 18 weeks 3 days' wages, at £20 a year ?

Divide £4645.10 by 2⅜.

Multiply £300.15.6 by 20.

If 3½ quarts of ale cost 1s. 9d., what will a barrel and 2 pints come to ?

Value 2465⅜ pieces of blue cloth at 50s. 6d. per piece.

If I lend you £200 and 3 crowns for 8½ months, at 50s. per cent. per annum, what will be the interest ?

Pay a workman for 18 weeks employment, at 3s. 3d. a day.

                                                                    £   s.   d.

17 tons 4 cwt. of potatoes, at 50s. per cwt.
 6¼ barrels of ale, at 4d. a pint . . . .
 2 hogsheads of ale, at 8d. per quart . . . . .
 3 tubs of pork, each 48 lb. at 4½d. a lb. . . .
20 pieces of sheeting, each 36½ yds. at 1s.1½d.
     per yd. . . . .

———

  17 tons 2½ cwt. of potatoes, at 5 lb for three halfpence.

  31½ puncheons of rum, at 2s. 3d. a quart.

  192¾ gallons of brandy, at 2s. 10d. a pint.

  If I save 4½d. a week, what shall I have in 19 weeks 3 days ?

  1¼ ton of potatoes, at 3s. 2d. per cwt.

  18 weeks' wages at half a crown a day.

———

  If I spend £50 a year, what do I spend a day ?
  Divide £249 and a crown by 17¼ and 2½.

  What is ¼th of a guinea, ⅝th of Pound, and ⅞th of a crown ?

  Reduce 182,409 groats to sixpences, and then to guineas.

———

  Divide 104 firkins of butter into 17 equal quantities.

  Divide 42 tons 3 hhds. 18 gal. 3 qts. of wine by 24 short division, and the same, long division.

  How many tons of mangel wurzel are there in an acre, each root weighing 12 lb., and each root 2 feet apart ?

———

	s.	d.
1 hhd. 10 gal. of British wine at 12	6 per gal.	
2½ barrels of beer	2	6
1¾ hhd. of ale		4 per pot.
120 gallons of gin............	10	8 per gal.
1800 bottles	1	9 per doz.

---

18 hhds. 27 gal. of beer at 56s. per hhd.
24 gal. 3 qts. of ale....... 2s. 3d. per gal.
15 dozen of port .... 2s. 6d. per bottle.
12½ do. of sherry .... 3s.

---

	s.	d.
19½ dozen of port........... at 2	6 per bot.	
30¼ score of sherry	3	2
1 pipe Madeira	4	0 per gal.
1 do Bucellas	2	6
3 do. 18½ gal. of British spirits .	1	8

~~~~~~~~~~~~

ARITHMETICAL TABLES.

MULTIPLICATION AND DIVISION TABLE.

Twice	1 are	2	3 times	1 are	3	4 times	1 are	4
	2	4		2	6		2	8
	3	6		3	9		3	12
	4	8		4	12		4	16
	5	10		5	15		5	20
	6	12		6	18		6	24
	7	14		7	21		7	28
	8	16		8	24		8	32
	9	18		9	27		9	36
	10	20		10	30		10	40
	11	22		11	33		11	44
	12	24		12	36		12	48

5 times	1	are	5	6 times	1	are	6	7 times	1	are	7
	2		10		2		12		2		14
	3		15		3		18		3		21
	4		20		4		24		4		28
	5		25		5		30		5		35
	6		30		6		36		6		42
	7		35		7		42		7		49
	8		40		8		48		8		56
	9		45		9		54		9		63
	10		50		10		60		10		70
	11		55		11		66		11		77
	12		60		12		72		12		84

8 times	1	are	8	9 times	1	are	9	10 times	1	are	10
	2		16		2		18		2		20
	3		24		3		27		3		30
	4		32		4		36		4		40
	5		40		5		45		5		50
	6		48		6		54		6		60
	7		56		7		63		7		70
	8		64		8		72		8		80
	9		72		9		81		9		90
	10		80		10		90		10		100
	11		88		11		99		11		110
	12		96		12		108		12		120

11 times	1	are	11	12 times	1	are	12
	2		22		2		24
	3		33		3		36
	4		44		4		48
	5		55		5		60
	6		66		6		72
	7		77		7		84
	8		88		8		96
	9		99		9		108
	10		110		10		120
	11		121		11		132
	12		132		12		144

MONEY TABLES.

Shillings.			Pence.					
s.	£	*s.*	*d.*	*s.*	*d.*	*d.*	*s.*	*d*
20 make 1		0	20 make	1	8	12 make	1	0
30	1	10	30	2	6	24	2	0
40	2	0	40	3	4	36	3	0
50	2	10	50	4	2	48	4	0
60	3	0	60	5	0	60	5	0
70	3	10	70	5	10	72	6	0
80	4	0	80	6	8	84	· 7	0
90	4	10	90	7	6	96	8	0
100	5	0	100	8	4	108	9	0
110	5	10	110	9	2	120	10	0
120	6	0	120	10	0			

TABLES OF WEIGHTS AND MEASURES.

TROY WEIGHT.

24 grains	1 pennyweight	*grs. dwt.*
20 pennyweights	1 ounce	*oz.*
12 ounces	1 pound	*lb.*

Gold, silver, and some liquids are weighed by this weight.

AVOIRDUPOIS WEIGHT.

16 drams	1 ounce	*drs. oz.*
16 ounces	1 pound	*lb.*
28 pounds	1 quarter	*qr.*
4 quarters or 112 pounds..	1 hundred weight	*cwt.*
20 hundred weight	1 ton	*t.*
8 pounds of meat........	1 stone	*st.*

Bread, meat, grocery, and goods in general, and all metals, except gold and silver, are weighed according to this table.

APOTHECARIES' WEIGHT.

20 grains	1, scruple	*gr.* Э
3 scruples	1 drachm	ʒ
8 drachms	1 ounce	ʒ
12 ounces	1 pound	*lb.*

This table is used by physicians, apothecaries, and druggists. —Apothecaries in making up their medicines adopt this weight, and sell drugs by avoirdupois weight.

CLOTH MEASURE.

2¼ inches.................	1 nail	*in. na.*
4 nails	1 quarter	*qr.*
4 quarters	1 yard	*yd.*
3 quarters	1 ell Flemish	*ell Fl.*
5 quarters	1 ell English	*ell Eng.*
6 quarters	1 ell French	*ell Fr.*

The above measures are used by linen and woollen drapers, in cutting out and measuring their goods, when either bought or sold.

LAND MEASURE.

144 inches...................	1 foot	*ft.*
9 feet.......................	1 yard	*yd.*
30¼ yards	1 pole	*po.*
40 poles ......·...........	1 rood ·	*ro.*
4 roods	1 acre	*ac.*

10 chains, or 4840 yards, or 100,000 links, are an acre.

Also,

640 acres	make	1 square mile
100 feet		1 square of flooring
272¼ feet...............		1 rod of walling.

LONG MEASURE.

3 barleycorns............	1 inch	*in.*
12 inches...............	1 foot	*ft.*
3 feet.................	1 yard	*yd.*
5½ yards	1 pole or perch	*po. or per.*
40 poles or perches.......	1 furlong	*fur.*
8 furlongs	1 mile	*mi.*
3 miles...............	1 league	*leag.*

This measure is used to measure distances of places, or any thing else where *length* only is required.

CUBIC OR SOLID MEASURE.

1728 solid inches.............	1 cubic foot	*sd. in.*
27 solid feet	1 cubic yard	*c. ft.*
40 feet of round timber, or 50 feet of hewn timber } ..	1 ton or load	*t. l.*
42 cubic feet	1 ton of shipping	*t.*

ALE AND BEER MEASURE.

2 pints	1 quart	*qt.*
4 quarts................	1 gallon	*gal.*
9 gallons	1 firkin	*fk.*
2 firkins...............	1 kilderkin	*kild.*
2 kilderkins.............	1 barrel	*bar.*
1½ barrel, or 54 gallons	1 hogshead	*hhd.*
2 hogsheads	1 butt	*bt.*

WINE MEASURE.

2 quarterns or gills	1 half-pint	*qtn.*
2 half-pints, or 4 gills..........	1 pint	*pt.*
2 pints.......................	1 quart	*qt.*
4 quarts	1 gallon	*gal.*
42 gallons	1 tierce	*t.*
63 gallons	1 hogshead	*hhd.*
34 gallons	1 puncheon	*pun.*
1½ puncheon or 2 hhds	1 pipe*	*pi.*
2 pipes, or 252 gallons	1 tun	*tu.*

———

DRY MEASURE.

2 pints	1 quart	*qt.*
4 quarts	1 gallon	*gal.*
2 gallons	1 peck	*pk.*
4 pecks..............	1 bushel	*bu.*
8 bushels	1 quarter of grain	*qr.*
5 bushels	1 sack of flour	*sk.*
5 quarters............	1 load of wheat	*ld.*
2 weys, or 10 quarters..	1 last	*l.*

———

COAL WEIGHT.

112 lbs.	1 cwt.	
224 lbs	1 sack	*sk.*
5 sacks....................	1 cwt.	*wt.*
20 cwt., or 10 sacks	1 ton	*to.*

* The pipe here specified is 2 hogsheads, or 126 gallons ; but a pipe of *foreign* wines varies from 110 to 140 gallons.

NOTE.—The old wine-gallons contained only 231 cubic inches ; and therefore 6 gallons of wine or spirits of old measure, are equal to 5 of new or *imperial* measure.

MEAL WEIGHT.

1 quartern or quarter of a peck of barley meal weighs .... 3 lbs.
1 peck ditto 12
1 quartern or quarter peck of flour 3½
1 peck of ditto. 14
1 bushel of ditto. 56
1 sack of ditto. .... 2½ cwt.

HAY AND STRAW.

56 lb. of old hay
60 lb. of new ditto .... 1 truss
36 lb. of straw
36 trusses................. 1 load
1½ load .... 1 ton

TIME.

60 seconds .... 1 minute	*sec. min.*
60 minutes .... 1 hour	*ho.*
24 hours .... 1 day	*da.*
7 days .... 1 week	*wk.*
4 weeks .... 1 month	*mo.*

Quarterly terms for payment of wages, rent, &c.

Lady Day, 25th March.   Michaelmas Day, 29th Sept.
Midsummer Day, 24th June. Christmas Day, 25th Dec.

Longest day in the year, 21st of June: shortest day, 21st December.

Every fourth year is called *leap year*, and consists of 366 days.*

* To find when Leap year happens, divide the given year by 4 ; if nothing remain, it is *leap year.*   G

ASTRONOMICAL TABLE.

60 seconds	1 minute	*sec.*
60 minutes	1 degree	*min.*
30 degrees	1 sign	*s.*

12 signs, or 360 degrees, complete the zodiac.

A TABLE OF ALIQUOT PARTS OF MONEY.

Of a Penny.		*Of a pound.*		*Of a pound.*		
$\frac{1}{4}$	$\frac{1}{4}$	d.		s.	d.	
$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{240}$	1	0	$\frac{1}{20}$
		$1\frac{1}{2}$	$\frac{1}{160}$	1	3	$\frac{1}{16}$
Of a Shilling.		2	$\frac{1}{120}$	1	4	$\frac{1}{15}$
d.		3	$\frac{1}{80}$	1	8	$\frac{1}{12}$
1	$\frac{1}{12}$	$3\frac{3}{4}$.	$\frac{1}{64}$	2	0	$\frac{1}{10}$
$1\frac{1}{2}$	$\frac{1}{8}$	4	$\frac{1}{60}$	2	6	$\frac{1}{8}$
2	$\frac{1}{6}$	5	$\frac{1}{48}$	3	4	$\frac{1}{6}$
3 .	$\frac{1}{4}$	6	$\frac{1}{40}$	4	0	$\frac{1}{5}$
4	$\frac{1}{3}$	$7\frac{1}{2}$	$\frac{1}{32}$	5	0	$\frac{1}{4}$
6	$\frac{1}{2}$	8	$\frac{1}{30}$	6	8	$\frac{1}{3}$
		10	$\frac{1}{24}$	10	0	$\frac{1}{2}$

A TABLE OF ALIQUOT PARTS OF WEIGHTS AND MEASURES.

Of a pound Troy		*Of a ton.*		*Of half a cwt., or 56 lbs.*		*Of a qr. of a cwt. 14 lbs.*	
6 oz.	$\frac{1}{2}$	10 cwt.	$\frac{1}{2}$	28 lbs.	$\frac{1}{2}$	14 lbs.	$\frac{1}{2}$
4	$\frac{1}{3}$	5	$\frac{1}{4}$	14	$\frac{1}{4}$	7	$\frac{1}{4}$
3 .	$\frac{1}{4}$	4	$\frac{1}{5}$	8	$\frac{1}{7}$	4	$\frac{1}{7}$
2	$\frac{1}{6}$	2	$\frac{1}{10}$	7	$\frac{1}{8}$		
1 oz 10 dwt	$\frac{1}{8}$	1	$\frac{1}{20}$				
1	$\frac{1}{12}$						

And in like manner the whole.

MISCELLANIES*

12 articles	1 dozen
20 ditto	1 score
144 ditto	1 gross
24 sheets of paper	1 quire
20 quires	1 ream
8 lb. of meat	1 stone
7½ lb.	1 gal. of train oil
36 trusses	1 load of hay or straw
56 lb.	1 firkin of butter
64 lb.	1 do. of soap
100 feet	1 sq. of flooring
272¼ do.	1 sq. of walling
5 bushels	1 sack of flour
50 feet	1 load of hewn timber
40 do.	1 do. of unhewn ditto
108 solid feet	1 stack of wood
128 ditto	1 cwt. of ditto
19½ cwt.	1 fother of lead
14 lb.	1 stone of iron
100 lb.	1 quintal
14 lb.	1 peck of salt
60 skins	1 roll of parchment
1760 yards	1 mile
16 bushels of bran or pollard	1 quarter
2 bushels	1 hundred of potatoes
4 ditto	1 sack
40 ditto	1 load

* For a variety of useful information, see the Author's little performance entitled "The Young Scholar's Manual of Useful Knowledge," price 9d. in paper cover, or 1s. neatly bound.

MISCELLANEOUS QUESTIONS.

Write down in figures the sum of eleven thousand, eleven hundred and eleven. *Ans.* 12111.

If 2 cakes cost 2½d., what will 2 dozen cost? *Ans.* 2s. 6d.

If 6 apples cost 2d., how many could I get for a crown? *Ans.* 180.

How many crowns are there in 50 guineas? *Ans.* 210.

How many yards of cloth at 17s. 6d. per yard can I buy for 13 cwt. 2 qr. of wool, at 15d. per lb.? *Ans.* 108.

If I pay 13s. 4d. a week, how many months' board can I have for £100? *Ans.* 37 mo. 2 wk.

A gentleman spends, one day with another, £1.7.0½, and at the year's end he lays by £340; I demand his yearly income. *Ans.* £848.14.4½

How many pairs of shoes at 5s. 9d. per pair ought to be given for 3½ dozen pairs of silk stockings at 17s. 3d. per pair? *Ans.* 126.

What quantity of raisins can I purchase for £3.10, if 7 lb. cost 2s. 11d.? *Ans.* 1½ cwt.

Bought spices at 10 guineas per cwt., and sold them at 2s. 0¾d. per lb.; what was the gain per cent.? *Ans.* £10.

If a clerk's salary be £73 a year, what has he a day? *Ans.* 4s.

The less of two numbers is 187, and their difference 34; what is the square of the product? *Ans.* 1,707,920,929.

What is the interest of £152 for 2 years at 2½ per cent. per annum? *Ans.* £7.12.0.

What is the amount of £1000 for 5½ years, at £4.15 per cent.? *Ans.* £1261.5.0.

A tradesman failed for £10,000, his effects produced £6798.10; what did a creditor receive, whose debt was £790.18? *Ans.* £537.13.10¼

A French franc is valued at 10d., how many in £100 ?
Ans. 2400.

A bankrupt's estate paid 7s. 9d. in the pound, and his debts amounted to £14,980, how much do creditors receive and lose ?

Ans. They received £5804.15.0, and lost £9175. 5 .0.

Divide £1000 amongst three persons; give A £120 more, and B £95 less than C.

Ans. A gets £445, B £300, and C £325.

If I buy a yard of cambric for 12s. 6d. and sell it for 14s. 3d. what do I gain per cent ? *Ans.* £14.

If 30 men in 40 days, build 50 rods of wall,
How many men in 60 days will do the same—that's all ?
Ans. 20.

Gave a hogshead of gin at 7s. 4d. a gallon, for 56 gallons of rum ; what is the rum worth a gallon ?
Ans. 8s. 3d.

If I buy at 16s. per cent, and sell at 8 guineas, what do I gain per cent ? *Ans.* £31.5.0.

If 3 cows can be kept upon 20 acres, 3 roods of grass land, how many acres will 25 cows require to be fed upon ?
Ans. 172 ac. 3 ro.

If 1 cwt. of cheese cost 2 guineas, how much can be bought with the sum of £23 . 10 . 10¾ ?
Ans. 11 cwt. 23lb. ⁴⁴⁸⁸⁄₅₀₄₈

If for 2s. 7½d. I can buy 7 lb of plums, what quantity can I have for £1059.14.3 ? *Ans.* 504 cwt. 2 qrs. 14 lb.

At what rate per cent will £936 amount to £1314.10, in 7½ years time, simple interest ? *Ans.* £5 per cent.

How many planks of 15 feet long, and 15 inches wide, will floor a warehouse 60 feet 6 inches long, and 33 feet 6 inches wide ? *Ans.* 108 $\frac{2.1}{2.2.5} = \frac{7}{75}$

Bought 274 yards of cloth for £217.9.9, half of which cost me 14s. 6d. a yard ; what did the remainder cost me a yard ? *Ans.* 17s. 3d,

Europe is supposed to contain 227,700,000 inhabitants ; how much would a halfpenny per head, per month, amount to in 7 years ? *Ans.* £39,847,500.

A balloon moving at the rate of 6,494 feet in a minute; how long would it be going round the earth ?
Ans. 14 da. 3 ho. 8 min.

How many barley corns will reach round the world, which is 360 degrees, and each degree 69½ miles ?
Ans. 4,755,801,600.

How many times will a wheel that is 2¾ yards round, turn between London and York, which is 198 miles ?
Ans. 126,720.

How many parcels of sugar, each 16 lb. 2 oz., are in 16 cwt. 1 qr. 15 lb ? *Ans.* 113, and 12 lb. 14 oz. over.

A gentleman left £50 to be distributed in the following manner :—to poor men, each 5s. ; to poor women, each 4s.; to poor boys, each 2s. 6d.; and to poor girls, each 2s., and that there should be an equal number of each; what was that number ? *Ans.* 75.

In 3 casks of oil weighing, No. 1, 4 cwt. 19 lbs. ; No. 2, 3 cwt. 1 qr. 17 lbs ; No. 3, 5 cwt. 3 qr. 18 lb. how many gallons, allowing 16 lbs per cwt. for tare, and 7½ lbs. net to a gallon ? *Ans.* 172 ½²⁄₁₃

What must I pay for 179 cwt. 1 qr. 13 lbs of sugar at 48s. 6d. per cwt ? *Ans.* £435 . 2 . 1¾ ⁶⁵⁄₁₁₂

How many ingots of gold, each 7 oz. 19 dwt. 13 gr. at 4s. 9½d. per ounce, may be bought for 500 guineas ?
Ans. 274.

What is the discount of £125 for 21 days, at £5 per cent ?
Ans. 7s. 2d. ⁶⁰⁄

What is the discount and present value of £487 . 10 . 8, due in 6 months, allowing £6 per cent ?
Ans. £14 . 4 discount; present value, £473 . 6 . 8.

In what time will £540 amount to £734 . 8, at £4 per cent ?* *Ans.* 9 years.

* As the interest of the principal for one year is to one year, so is the whole interest to the time required.

At what rate per cent will £540 amount to £734.8 in 9 years ?*   *Ans.* £4 per cent.

A mercer bought 13½ pieces of silk, each containing 24⅘ ells, at 6s. 0¾d. per ell; how much did the whole come to?   *Ans.* £26.3.4¾

How many halfpence are there in £100, and as many guineas?   *Ans.* 98,400

Three persons purchased a ship; A pays ⅖, B ⅜, and C £2700 for the remainder; what is the value of the vessel?   *Ans.* £12,000.

Light travels at the rate of 192,268 miles in a second, how long is it coming from the sun?   *Ans.* 8 min. 14 sec.

If a piece of wainscoting be 8 ft. 6 in. long, and 2ft. 9¾ in. broad; what is the superficial content, and value at 10½ a foot?   *Ans.* 24 ft. 0 in. 3 pts. ; value £1.1.0.

In a cistern 8 ft. long, 5 ft. deep, and 20 broad, how many gallons of water will it hold, 1728 cubic inches in the square foot?   *Ans.* 408 ¹⁰⁸⁰⁄₁₄₁₁ gallons.

What is the compound interest of £860 for 2 years, at 4¾ per cent per annum, the interest payable half yearly?   *Ans.* £84.13.1¼

Bought 27 bags of ginger, each weighing gross 84¾ lbs. are 1⅛ lb. per bag, tret 4 lbs. per 104 lbs., what do they come to at 8½d. per lb.?   *Ans.* £76.13.2¾ ²

What is the value of 625 of a pound, 34 of a shilling, and 95 of a penny?   *Ans.* 12s. 10¾d.

What is the square root of 179,136?   *Ans.* 444.

What is the square root of ¹⁶⁹⁄₄₄₁?   *Ans.* ¹³⁄₂₁

What is the cube root of 9,938,375?   *Ans.* 215.

What is the cube root of ⁵¹²⁄₃₃₇₅?   *Ans.* ⁸⁄₁₅

* As the principal is to the interest for the whole time, so is £100 to the interest of the same time; then divide that interest by the time and the quotient shows the rate per cent.

MARKS AND SIGNS.

A, at.

C. or *Cwt.*, one hundred weight, or 112 lbs.

Cr., creditor.

B.P. bills of parcels.

Ditto or *Do.*, the same.

Dr., debtor or doctor.

Fol., folio.

Hhd., hogshead.

No., number.

Qt., quantity or quart.

Per or *pr.*, by.

P.S., postscript.

L. libra, a pound sterling.

S. solidus, a shilling.

D. denarius, a penny.

Vid. videlicet, that is to say.

O.S., old style.

N.S., new style.

A.M. ante meridiem, in the forenoon.

P.M. post meridiem, in the afternoon.

L.D., Lady-day.

Mds., Midsummer.

Michs., Michaelmas.

Xmas., Christmas.

Qr., quarter.

St., saint.

Q.D. quasi dicas., as if he should say.

L. liber, a book.

Co., company.

I.E. id. est, that is.

Inst., this month.

Ult. ultimo, last month.

M.S., manuscript.

M.S.S., manuscripts.

Q., question.

A., answer.

E.G. exempli gratiâ, as for example.

Rev., reverend.

M.P., Member of Parliament.

E. W. N. S., east, west, north, south.

N.L., north latitude.

S.L., south latitude.

Et Cætera, and so forth.

Per cent, by the hundred.

In toto, altogether.

Item, also.

Mem. memorandum, things to be remembered.

Vide, see.

4° 15′ 33″—4 degrees, 15 minutes, 30 seconds.